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W15. GWR 12T "Shocvan" (Shock Absorbing Van).

This document was produced by 'The Wagon Man' and was written for the FMES on line readership. 'The Wagon Man' is a Committee Member of FMES and has as his speciality producing scratch-built models of Railway Wagons in 5-inch gauge. This series of Articles includes his personal perspective on this fascinating branch of the hobby.

Part 15.

1. The Model, and its Exhibition Description Card of July 2023

In 1937 the Great Western produced the prototype of a shock absorbing van in an attempt to minimise damage to fragile goods (tiles, glass, beer and vegetables have all been reported) resulting from shocks resulting from heavy shunting. Eventually over 100 were built in various batches, each with detail changes.

The van body was not directly attached to the underframe, but on a subframe sprung in a longitudinal direction to give up to ±150 mm (±6 inches) travel. It was constrained laterally.

It would appear that, similar to GW Toads, each had its own allocated depot. The model is based on a photograph bearing the notice "RETURN EMPTY TO FISHGUARD WR". Computer enhancement also shows the word "Pilkington" chalked on it, dated 1970. Pilkington, a highly reputed glass manufacturer, had a specialist operation at St Asaph in North Wales, closing in 2008.

The three vertical white stripes on the sides and ends indicate that it is a Shock Absorbing Wagon.

2. Supplementary Information

The model is completely scratch built, and is based on a drawing originally published in 4mm scale, supplemented by as many photographs as could be found (which were precious few!). It is built from metal and MDF, and uses conventional construction methods. The metal T and L sections were milled to size from aluminium sections from the local DIY.

Base Data

For such a relatively recent design, information was difficult to obtain. Though the model itself is of a GWR variant, photographs show that the GWR and LMS versions had many similar design features.

The Underframes.

Conjectured Full Size Implementation.

Much head scratching and study of photographs was required to arrive at a reasonably confident conjectured implementation as follows. In full size, the underframes could be a standard 10 ft WB type, with minimal modifications and additions - arrangements to limit the Body travel longitudinally, but constrain it laterally. The underframes were also fitted with non-standard Buffers. The Shock Absorbing Springs are attached to the Body floor and this arrangement could then be dropped onto the underframe. It would certainly make sense from a production standpoint, in that it would be cheaper to produce a relatively small number of Non-standard Bodies rather than special Underframes. No other information has been located, and as ever I would welcome any enlightenment from the reader.

Construction.

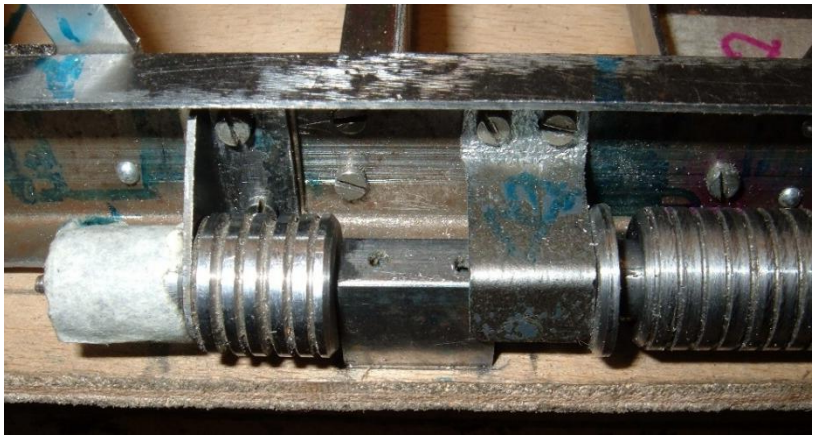
The underframes follow the usual well-established methods, and will not be discussed further. The following paragraphs address the modifications to them in more detail.

Longitudinal Body Constraint. The limit functions, both longitudinal and lateral, require interaction between both the Underframes and the Body, but for convenience they will be treated here together.

There is a Bump Stop consisting of a cranked fitting attached to the underframe, and a block attached to the body as shown below. The Body is centred on the Underframes and would normally sit midway. The full-size body is 305 mm (1 ft) shorter than similar conventional GWR vans, and can move $\pm$ 6” longitudinally. In the model this converts to $\pm$ 13mm ($^1/_2$“) float.

The photogaph shows a Bump Stop fitted at the outboard of each end of the Springs. It also shows a body-mounted Block (and hence the Body) at the extreme of its travel. Normally the face of the Block would not be in contact with the Bump Stop; rather, it would sit midway.

The end of the body mounted spring can also be seen in the photograph. Details of the spring arrangements are given later in the Body section of this note.



Non-standard Buffers. The Buffers are of unusual shape, as shown below. I have not been able to locate a detailed drawing of them, so I had to work from photographs. They do appear in outline on a works drawing which, annoyingly, calls up another works drawing for details.

The same drawing refers to them as “Duplex” buffers, implying that they may be a 2 stage system which changes resistance as the buffer becomes more compressed. They appear to be self-contained, so are probably hydraulic. Incidentally the photograph also shows the Body centred on the Underframes and the allowance for its longitudinal movement.

The Body.

Other than the length difference, the Body uses conventional methods, and its construction will not be discussed further. The photographs below were taken during the build.

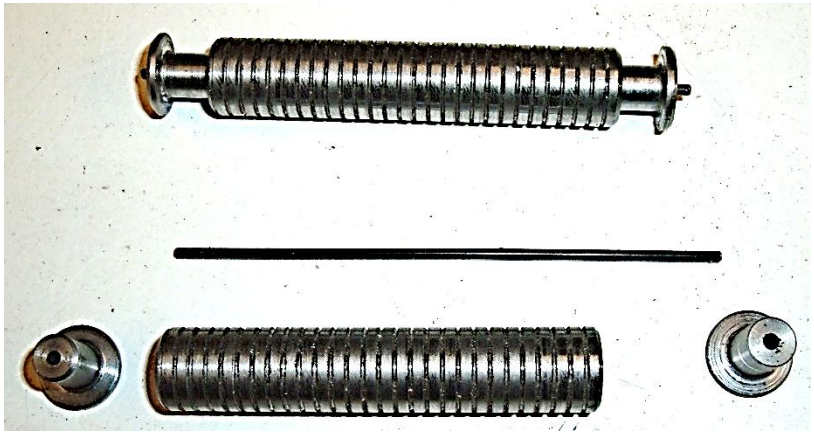
Lateral Body Constraints. The Lateral Constraints are hooked fittings attached to the Body floor at each corner, and which wrap around the top flange of the Underframe. They needed careful adjustment as movement of any one of them requires repositioning of the other three to maintain the correct alignment of the Body wrt the Underframes in the normal (undisturbed) position, yet be free enough to move easily.

They also prevent the Body from lifting vertically.

Shock Absorber Arrangements.

Longitudinal shocks, eg due to heavy shunting or a breakage in the coupling hook, are absorbed by a spring assembly mounted on the body. When fitted to the underframe the spring sits between the flanges of the underframe, and lines up with the Bump Stops. Movement of the Body is transmitted to the Spring via body mounted Blocks bearing on the Z-shaped fixture on the frame.

In practice the springs are not coil springs, but are a stack of rubber elements. As LBSC once said, you cannot scale nature and on a model they would be too solid to function. The challenge was to produce a realistic working representation. This was achieved by internal coil springs in a dummy outer body. The photographs show the situation when undeflected. (A photograph in the section describing the Bump Stop shows the situation at maximum deflection.)



Comment.

An interesting wagon in full size, but one presenting a significant challenge in model form.

Whilst the construction of the model was completely conventional, requiring no new skills or techniques. However, the biggest problem was in the shock absorbing arrangements. The issues were threefold:

1> The availability of basic information – you have heard this cry before.

2> Understanding **how** the system worked. Many hours of study of photographs and works drawings produced some details and some tantalising hints, but these had to be interpreted and amalgamated to produce a reasonably accurate working model.

3> The design of the spring. This was made difficult by a safety issue identified early in full size operation. The possibility of injury due to trapped limbs was high. Most of the available photographs show the solution to the problem – a cover was fitted over the entire assembly. I could have cheated and taken the easy way out. The shock absorbing arrangements would not necessarily need to be functional. However, having spent a lot of time to research, design, and produce a realistic working arrangement I was determined not to hide it!

Principal Reference Sources.

- **GWR**
  - Freight Wagons and Loads in Service on the Great Western Railway and British Rail, Western Region. Author: J H Russell.
- LMS
  - Official Drawings of LMS Wagons (Volumes 1 & 2). Author: R J Essery.
  - The LMS Wagon. Authors: R J Essery and K R Morgan.

3. Wider Participation

This Section is for your feedback, experiences, what gave you the most satisfaction and anything else to help and encourage the next generation of model engineers of whatever discipline.

We would be extremely interested to receive your reactions and suggestions – these will be of great interest and most useful. And don't forget your suggestions for topics for the occasional Supplement.

Please send them via info@fmes.org.uk There is no closing date for submissions.

Many thanks in advance.

The Wagon Man

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