Masterclass MLS-2

Build a 2-6-6T / 0-6-6T Mason Bogie

An Adventure in 1:20.3

By David Fletcher

Chapter 6 - The Mason Valve Gear.

Background – Construction

Well this has been a while coming! The world seems to have changed since I began setting this class up in late 2001. However we are now clear to run the class through to completion, and oh boy are we close to finished already! To the end of chapter 5 you will have already completed all the major components of the model. In chapter 6 we now install the valve gear to the BBT chassis, and in chapter 7 we install the pipework and detail the backhead. The model will be complete at that point, only leaving chapter 8 as a summing up and discussion about decals and decoration. Keep the faith, chaps, we're almost there. Never losing sight of the format of these Masterclasses, this chapter contains a "Background" section and "Construction" section.

Background- In this chapter, one of our best brings us the story of the Articulated loco. This is a really good summary of the development of the narrow gauge articulated locomotive in its many guises. We are especially proud to have Chris Walas present this to us, and thank him for the dedicated research and time he has put into Fairlie locomotives generally. Please enjoy this "Background" section. ***<<Fairlies.pdf>>***

Construction- In this chapter we finally place the BBT chassis under out models and install the rods, valve gear and bell rig assembly. This takes the model from the static to the animated, and what animation it is!

Access to Sub-Articles:

This chapter also contains 3 sub-articles aimed to builders who have not ordered any BBT chassis and would like to participate in building a Mason Bogie. Also any one of these 3 chassis options might be useful to builders awaiting their BBT chassis, and would like a 'stop gap' temporary chassis to fit to their model so that they can have a running model sooner. You can then swap out the chassis for the BBT when it arrives.

All 3 chassis methods require a motor/gearbox, drive wheels and wipers from Hartland Trains.

It should also be noted that while the motors and parts are of high quality, on par with LGB, the power of the locomotive, derived from any one of these three chassis options will be NO MATCH for the power and performance of the BBT chassis. They will make for a nice running model, capable of pulling typical loads this sort of loco would handle in her day, but no more. Therefore should you be awaiting the BBT chassis and do take up one of these alternatives as a 'stop gap' then please take the time to swap back to the BBT chassis when it arrives, the advantages in performance will be worth it. Likewise do not cancel your order with BBT - it is worth the wait, and worth making the chassis swap at that time.

Here are links to the 3 chassis options:

Build your own chassis from Styrene - *By David Fletcher & Phil Jensen.* ***<<MC2002-DIYchassis.pdf>>***

Assembly Instructions for the lasercut stainless steel chassis - *By David Fletcher.*

A highly detailed bar frame chassis for the power truck only. ***<< MC2002-laserchassis.pdf>>***

Build your Own 6 wheel Tender Truck - *By Jens Lasch.*

The building of this tender truck can serve with any of the chassis options above. ***<<MC2002-tendertruck.pdf>>***

The Mason Bogie Archive.

Keep reviewing the Mason Bogie Archive.

http://www.ironhorse129.com/Prototype/MasonBogie/Mason_Bogie.htm

The site is constantly being updated as more photos of Masons come in. Keep searching your books, old photos and magazines, and send us any Mason Bogie photos you might find that don't appear to be in the current Archive. Also send us pictures if your images are clearer than the many we have in the current Archive. E-mail the images as a jpg scan; 300 bit-per-inch images preferred.

The Masterclass Forum.

Please direct your discoveries, discussions and questions to our Masterclass and Articles forum at Mylargescale.com.

http://www.mylargescale.com/forum/forum.asp?FORUM_ID=46

Mason Bogie Parts.

Per previous chapters, we'll unveil new parts as brought to us by other members.

Sadly we have to report to the closure of CSC Innovations. Chuck from CSC has moved onto other areas in his life and will not be producing any more train parts for us for the foreseeable future. We also sadly see the end of John Clark's Fall River Productions.

Additionally Vance Bass of FH&PB Supply Co. has closed his doors too. This means the Mason Bogie cab, pilot and tender shell parts are no longer to be made. Vance informs us that there is no old stock remaining. We are especially thankful to Vance for his huge contribution to this class, and to me personally in proofreading the chapters. His product was about the best one could buy, so we hope that in time to come Vance will be back. While his products will be missed, we are still very fortunate to have his support and expertise available to us here.

Regardless of these sad closures, please always drop a note into the Masterclass forum if you're after specific Mason parts. Many members have come and gone in this class, and as such there may be parts available from other members.

New Parts!

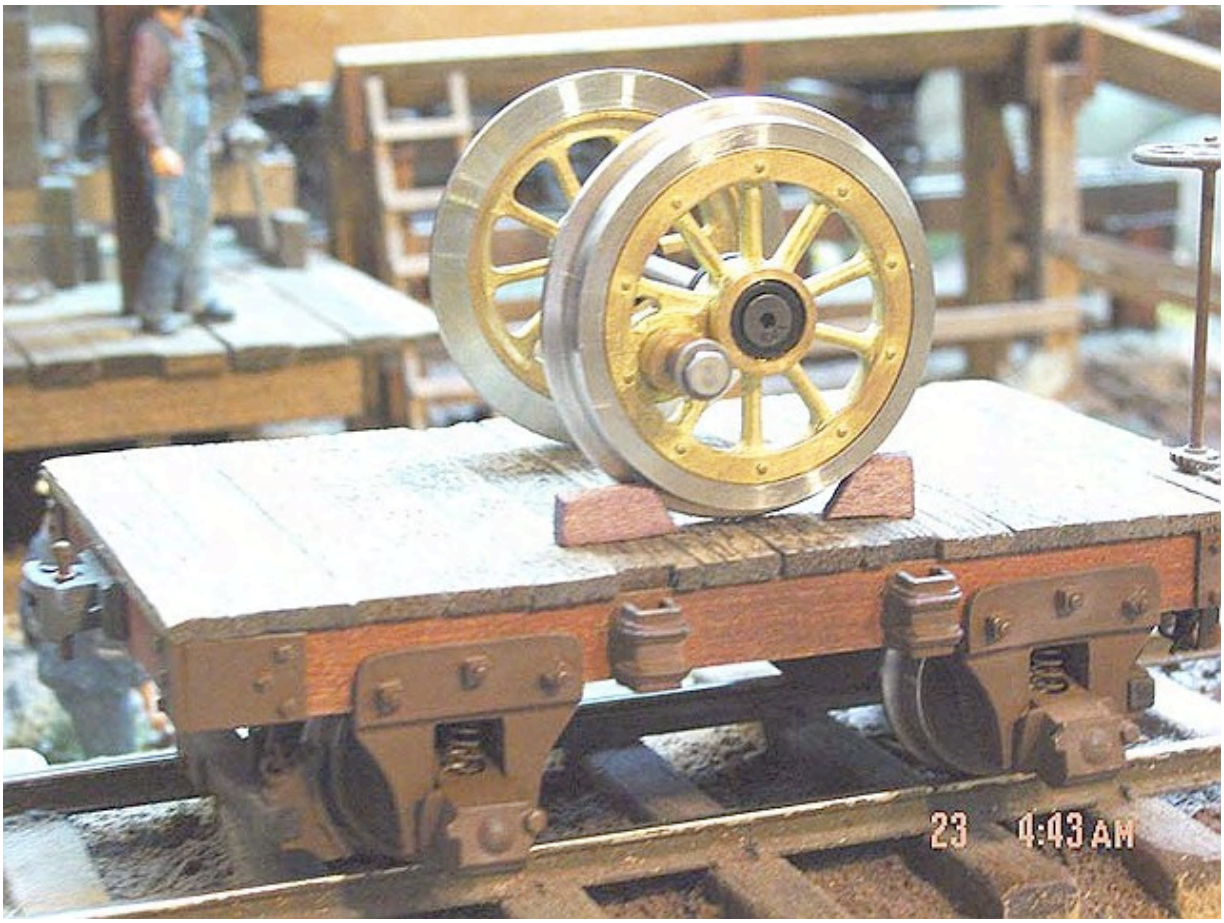
We have some new parts that have been made and advertised in the forums over the last couple of years.

The Bell-Rig.

Jim Barron, who is building a most extraordinary Mason Bogie from this class, arranged to have his hand made brass Bell Rig and Star Stanchions made into castings available to all. These castings are amazing and certainly reduce the effort required in making a couple of the more difficult assemblies from Chapter 3! Jim has produced, advertised and sold most of these casting, however should significant interest be there, I'm sure more could be made. Please contact Jim via Rich Schiffman via the Masterclass forum. Here are his magnificent parts:

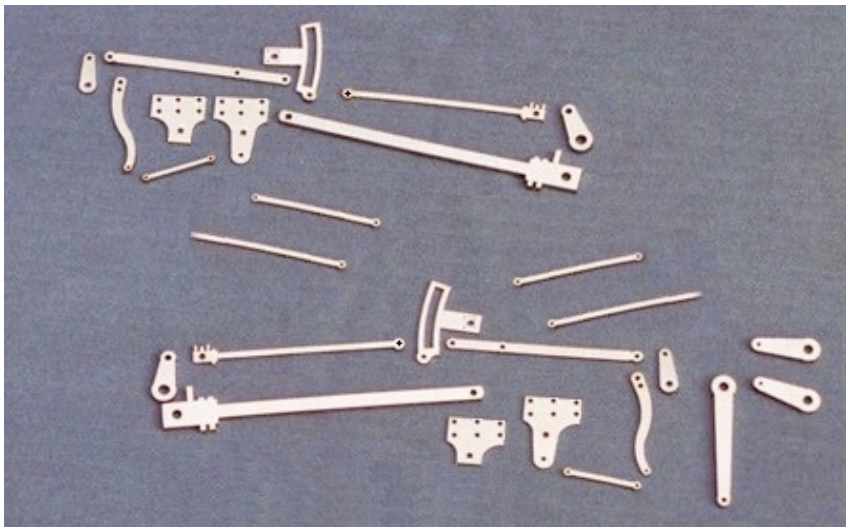
Mason Bogie Wheels.

Rich Schiffman, with from Jim Barron and Allan Pollock have also been hard at work producing a real prototypical Mason wheel as a retrofit to the BBT chassis. Again, these wheels have been advertised in the Masterclass forum over the last year and are all sold. Should interest in more be high, a second run may be possible. The wheels have been provided to BBT for fitment to BBT chassis upon request. These wheels are works of art, and it just felt so good just holding them! Here is one of the wheel sets:



Mason Valve Gear Sets.

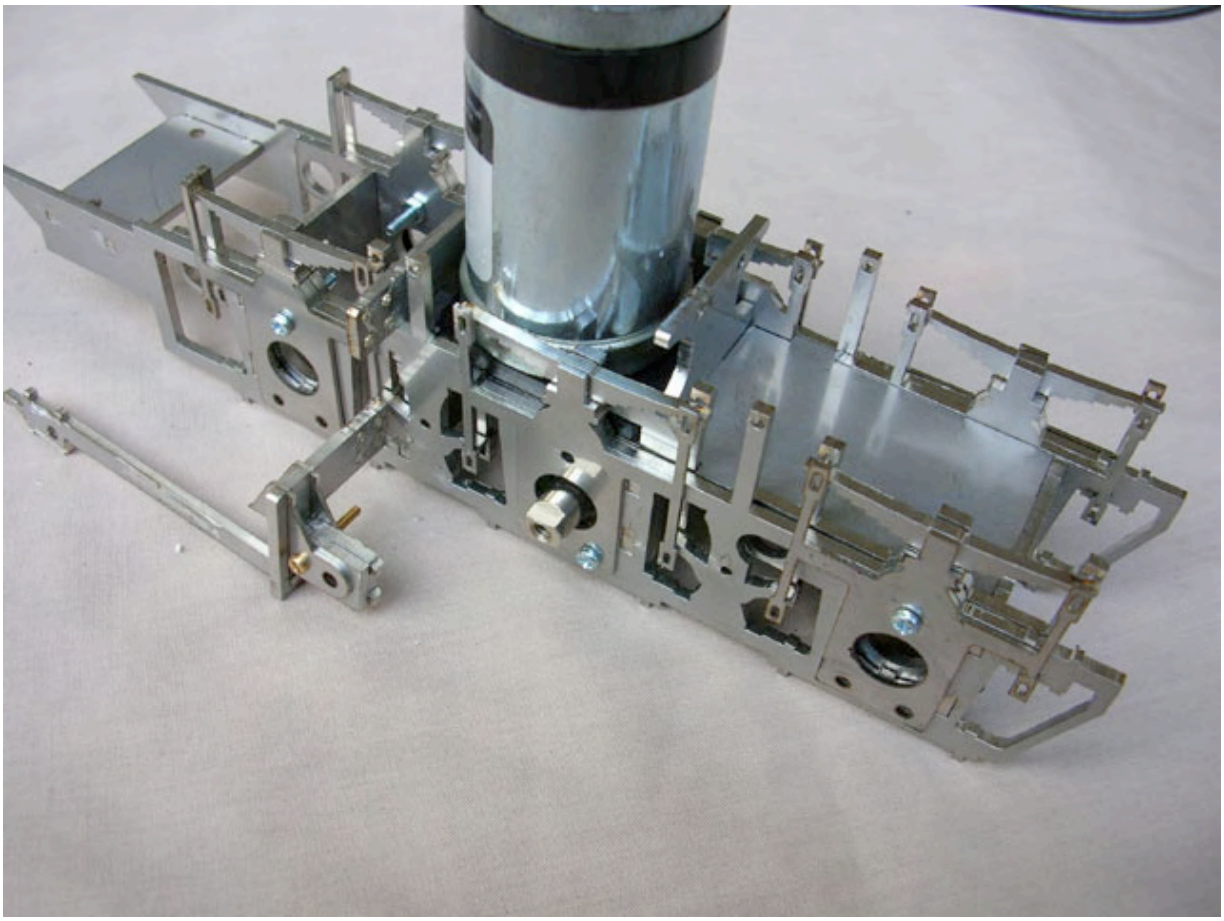
Finally, even I have gotten into this manufacturing thing in order to help reduce the difficulty of building a fully working Mason valve gear. As such, I produced the entire Mason valve set on CAD, and had the sets laser cut from 1.2mm thick grade 304 stainless steel. This was a real first for me, as I produce CAD work for parts all the time, but never arrange to manufacture these myself. The interest was high, so we cut 114 valve gear sets in January 2005, and all have been sold and distributed. If anyone wants a set, please note this in the Masterclass forum and we can produce more sets at any time, so long as we have a minimum order of 20 sets in total. I can cut a single set upon demand, but the cost is very high. Here is the valve gear set:



This set is prominently used in this very chapter. The chapter is written on the basis that this set has been acquired. If you had planned to hand make the valve gear all along, and have not bought this valve set, fear not, the valve gear PDFs are included in this chapter which will enable you to hand make these exact same parts. There will be no "wimps way" valve gear assembly in this chapter as previously advertised because buying this laser cut valve gear *is* the "wimps way"!!

The Mason Bogie Class parts all laser cut.

Stay tuned for updates about this at MLS. With the success of styrene laser cutting by Rick Raively in the CP Huntington Class, we're exploring the possibility of laser cutting all the major assemblies for the Mason Bogie from the class templates, including cab, pilot, smokebox front, headlight, tender shell, firebox, optional styrene chassis frame for use with Hartland wheels and drive, running boards and decks. The only parts left to be hand made would be the boiler, stack elements and detailed wrappers rivet heads and pipework etc. We've also experimented with a stainless steel full bar frame all laser cut for use with Hartland drives, wheels and elec contacts. See this chapter for details of the assembly. These frames will most likely be available in batches, so long as minimum orders are placed.



Art Wallace's Book.

This has been a much anticipated book release:

Mason Steam Locomotives - By Arthur W Wallace.

Heimburger House Publishing Co

7236 West Madison St

Forrest Park, Illinois 60130.

The book represents a lifetime's research into William Mason and his works. About 50% of the book is dedicated to the Bogie locomotives as a developmental progress from his 4-4-0s of the 1860s. While you will probably not learn anything specifically new about the Masons of the South Park, you will learn loads about the context of the locomotive design, what was happening at the same time, and loads about small engineering details such as changes in steam pipe arrangements and valve gears. I believe this to be landmark book for anyone interested in steam technology or William Mason's work in general. It must also be reminded that most of the engineering info used to build and detail our models throughout this class come from Art Wallace's drawings and information.

Try and get a read of this book sometime.

Introducing Bill Gould.

Over the years of this class, we've been pretty much directed by information gained from the superb drawing set done by Art Wallace in the mid 1980s. The set of 7 reconstructed engineering drawings at 1:8 scale are the finest drawings of Mason Bogie details in existence and are a testament to Art's extraordinary lifetime research into William Mason and his Bogie locomotives. Everything anyone really knows about the Bogie has come from Art's research at some point. Sadly his drawing set was not published as part of his recent book on William Mason. The book is excellent, and I highly recommend the purchase, but detailed drawings of the Bogie are not included in that book. Infact the 1:8 drawing set is getting very hard to find, no more copies are being made as the drawing set original is frankly worn out. The prevalence of inaccurate bogie drawings out there far out weight the limited number of these highly detailed drawings from Art. This is sad because in time, the inaccuracies become the standard, and the level of detail we've learned from Art, and applied to our models here in the Masterclass slowly become invalid. There is hope!

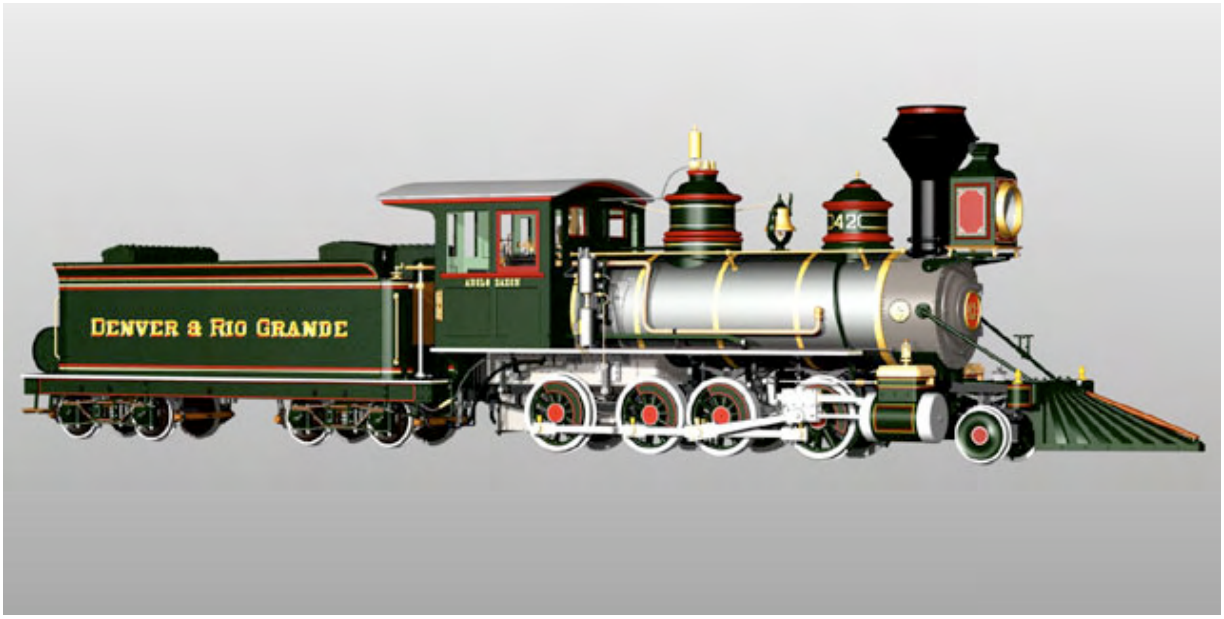
Bill Gould is a professional model maker and patternmaker (for almost all model railroad manufacturers, and owned The Gould Company line of plastic kits) and a 3D modelling artist who in recent times has produced a fine Class 60/C-16 2-8-0 and Class 40 2-6-0 full-colour lithos as well as drawing sets in 1:24 and 1:20.3 scales. As I write this he is doing the finishing touches to an outstanding Bogie drawing in 3D, which includes a large number of detailed drawings. The colour scheme worked up for his bogie is based on the Chocolate brown scheme noted by an eye witness at the time on the DS&PRR. Jim Wilke has aided Bill in getting the scheme correct to the period and is one possible example of what the real Mason Bogie looked like.

The Coloured drawing set will be available from Gould Studios, along with continued advice from Jim Wilke to aid you in your Bogie Colour schemes, including options for base colour and wheel colour choices.

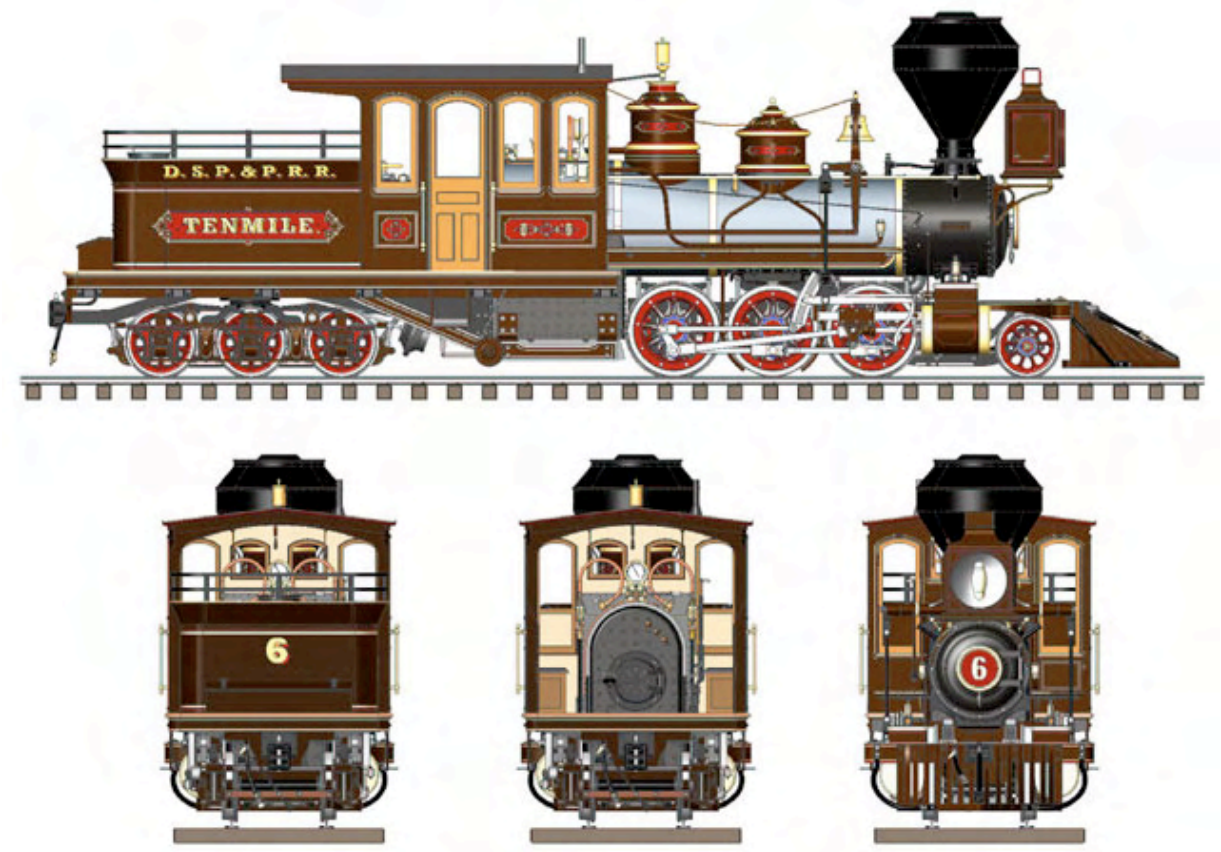
We can discuss the Mason drawing set further when it comes out, but the C-16 drawing set he has on the market is easily the finest C-16 drawing I've ever seen. It is highly accurate, being based on copies of over 40 original builder's drawings, and has sorted many of the lil tricks and inaccuracies that have shown up in past C-16 drawings. These are the best 1880 era drawings of the C-16 in existence and we'll be using these in the C-16 Masterclass in future. Take a look at Bill Gould's web site:

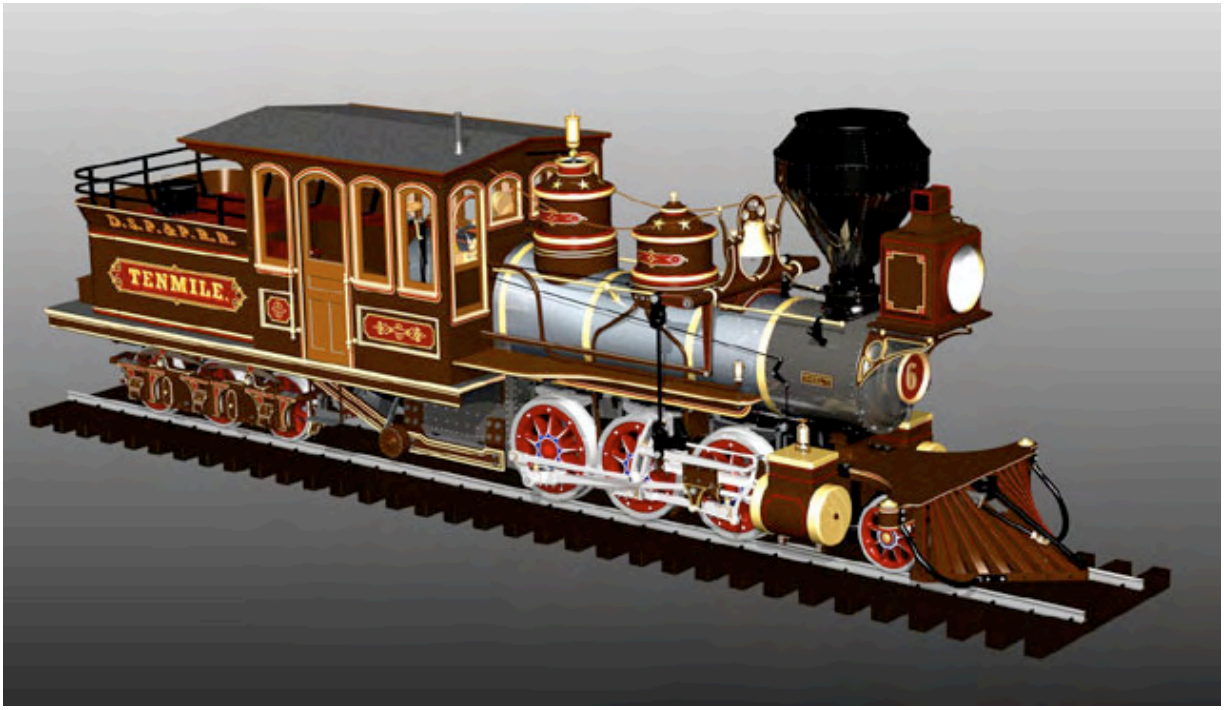
www.GouldStudios.com.

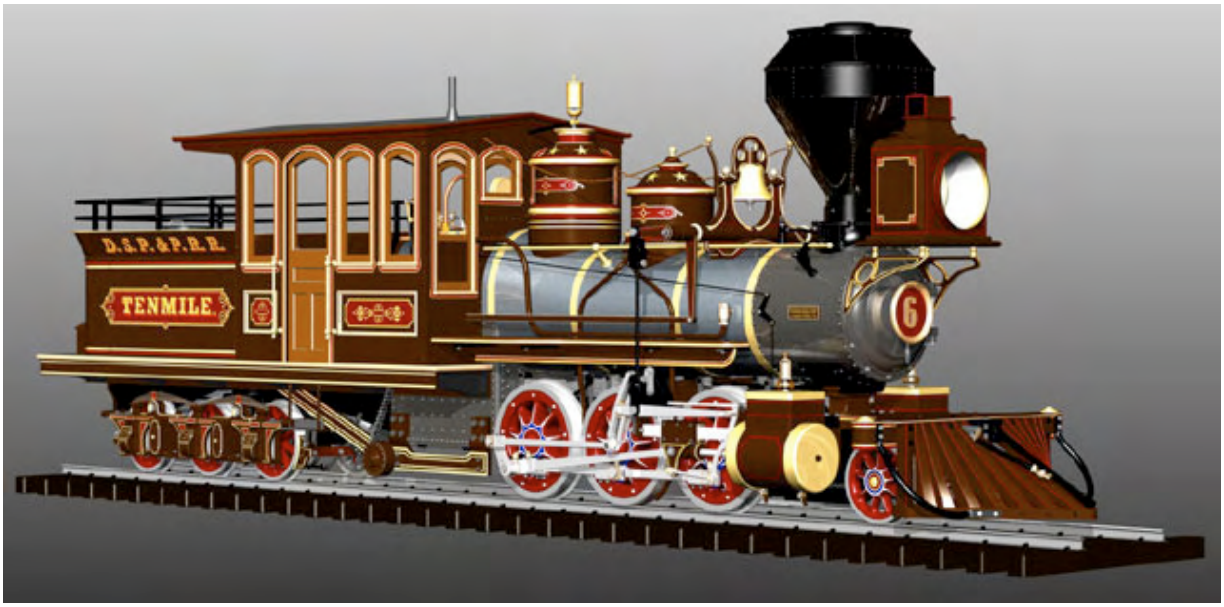
Here is Bill's SolidWorks 3D Class 60, with correct colour scheme for 1880, D&RG engine #42.



Here is an example of the SolidWorks 3D computer Bogie model Bill is working on:







The Ghosts of Mason Bogies Past, Present & Future.

The last of the Mason-Fairlie Single Bogie Locomotives.

This is a quick review of the last two surviving original Single Fairlie type Bogie locomotives in the world. The last Mason Bogie is the famous "Torch Lake" 0-6-4T from the copper mines area of upper Michigan. This locomotive is today the pride of the Henry Ford Collection at Greenfield Village, Michigan, and is fully operational after undergoing a recent major overhaul. The Narrow

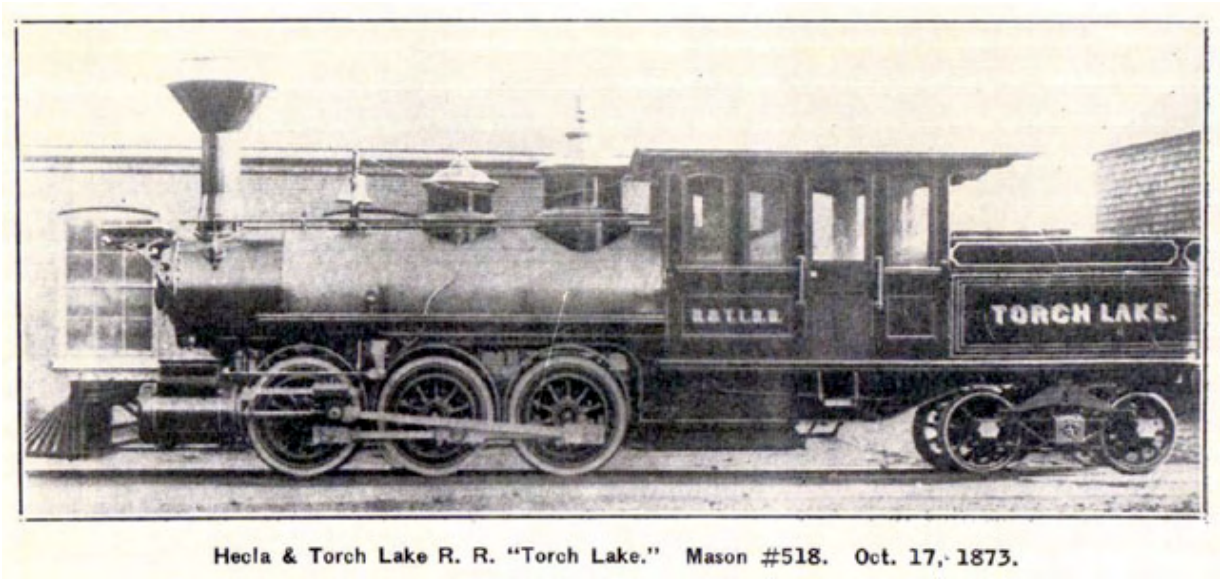
Gauge Convention of 2005 was held at the Museum, and some of our Mason class members enjoyed seeing this locomotive in action.

The other survivor is the last of the British built "Single Fairlies", now preserved in a lonely corner of New Zealand's south Island. I was fortunate to crawl over this 0-6-4T in April 2003.

Hecla & Torch lake #3 "Torch Lake" - The Last Mason Bogie in the World.

Arguably one of the more functional Mason Bogies, and among the earliest of Mason's Bogie locomotives to be built, 0-6-4T "Torch Lake" was built in 1873, Mason's 518th locomotive.

This was Torch Lake as delivered in 1873:

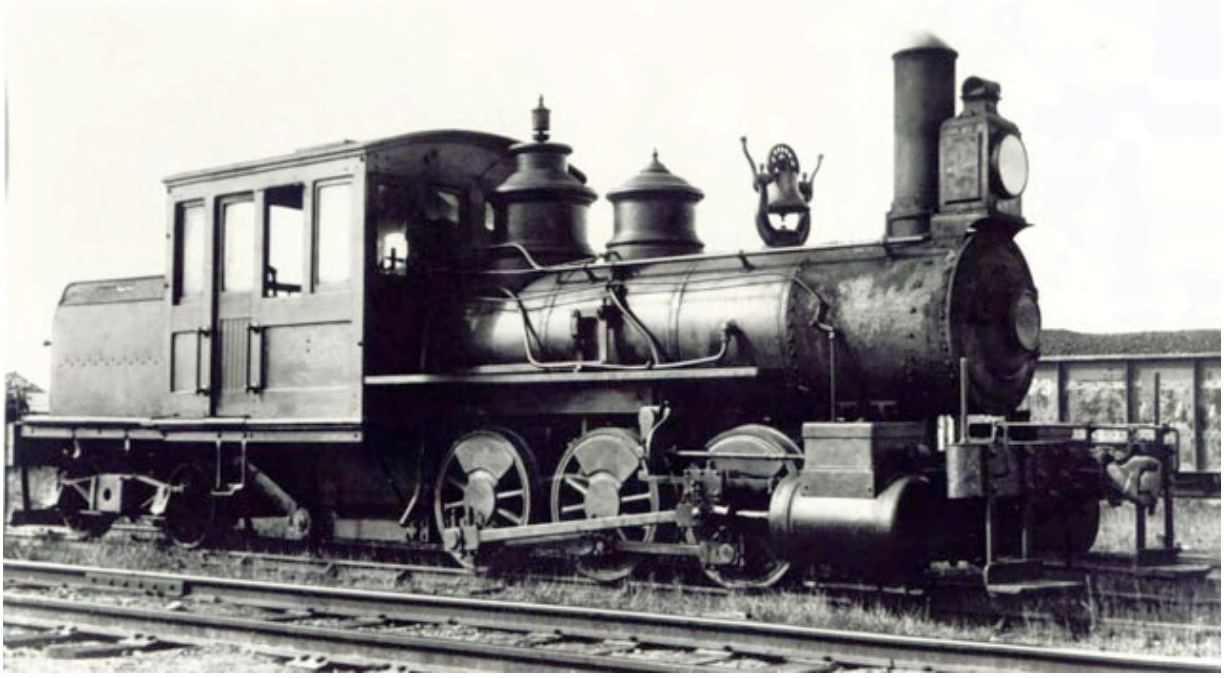


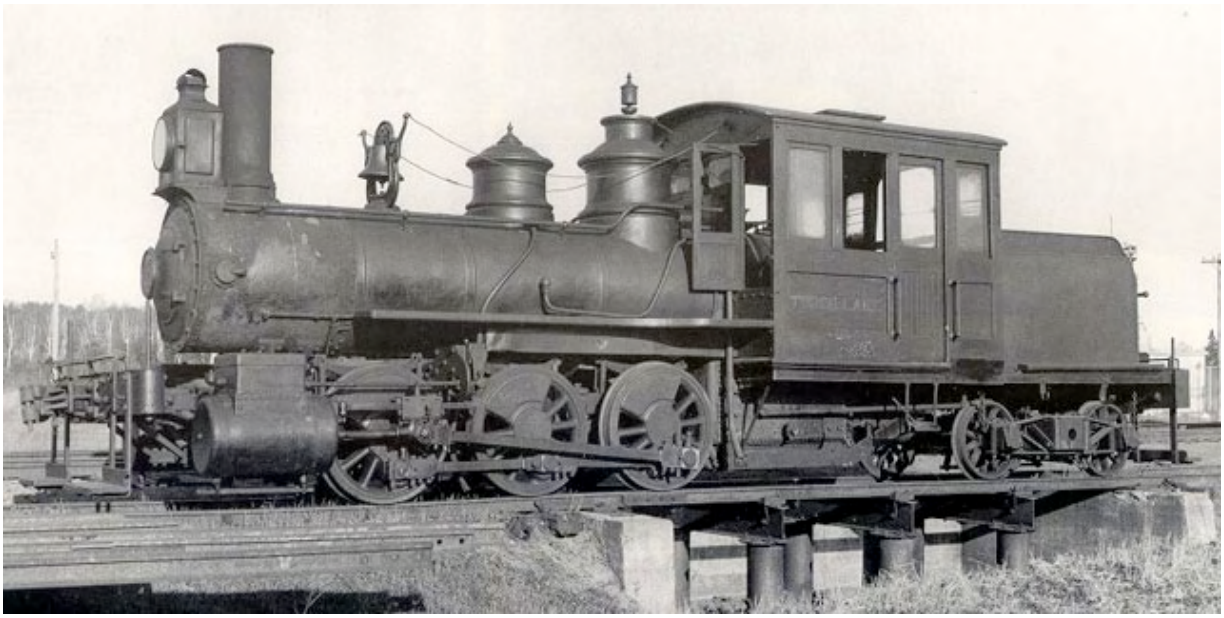
Hecla & Torch Lake R. R. "Torch Lake." Mason #518. Oct. 17, 1873.

The Hecla & Torch Lake RR was built to the unusual gauge of 4' 1", said to be the result of an error made by the original manufacturers of Locomotive #1, an upright boilered locomotive named "Fluke". In all, the line would own six Mason Bogies of the 0-6-4T configuration, built between 1873 and 1887. By the mid 1830s, the road was still operating 5 Mason Bogies and several camelback locomotives.

Here is sister loco "Red Jacket" as photographed in "as built" condition.

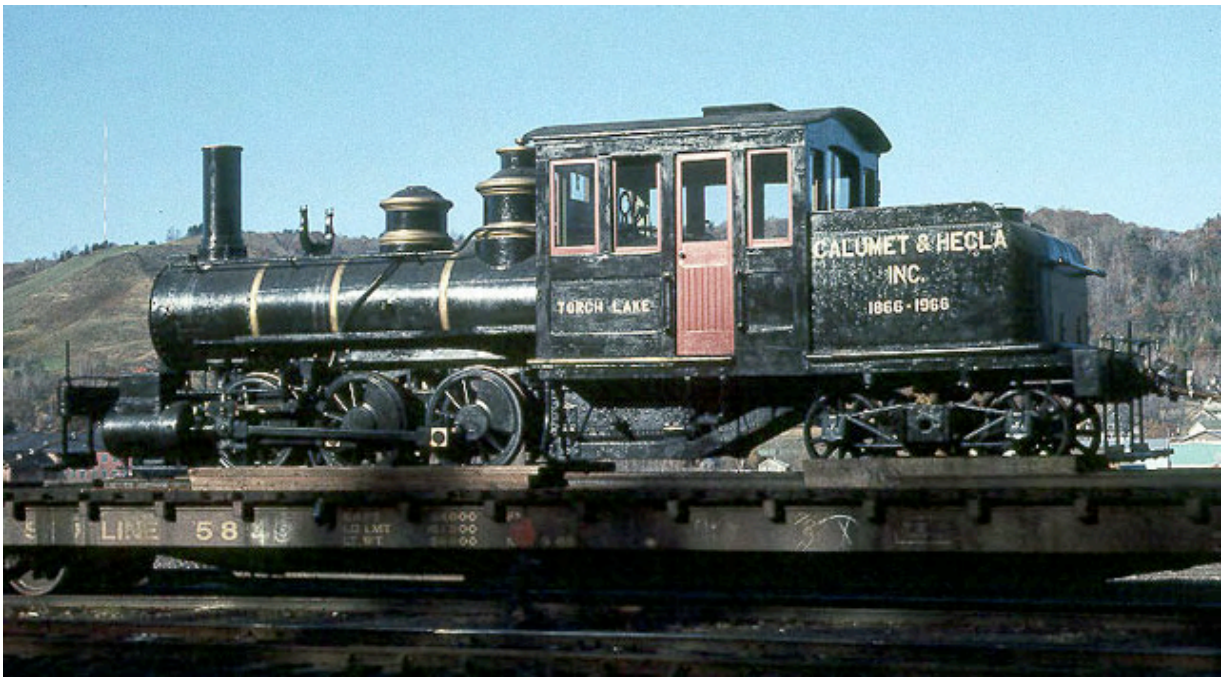
Next, a selection of photos of Torch Lake in her last days in service. Visually, she may look far removed from her 1873 style, but she is in fact surprisingly original. The changes are mostly cosmetic, upgrades and so on. Also, changes occurred as a result of major damage in a roundhouse fire around the turn of the 20th century..



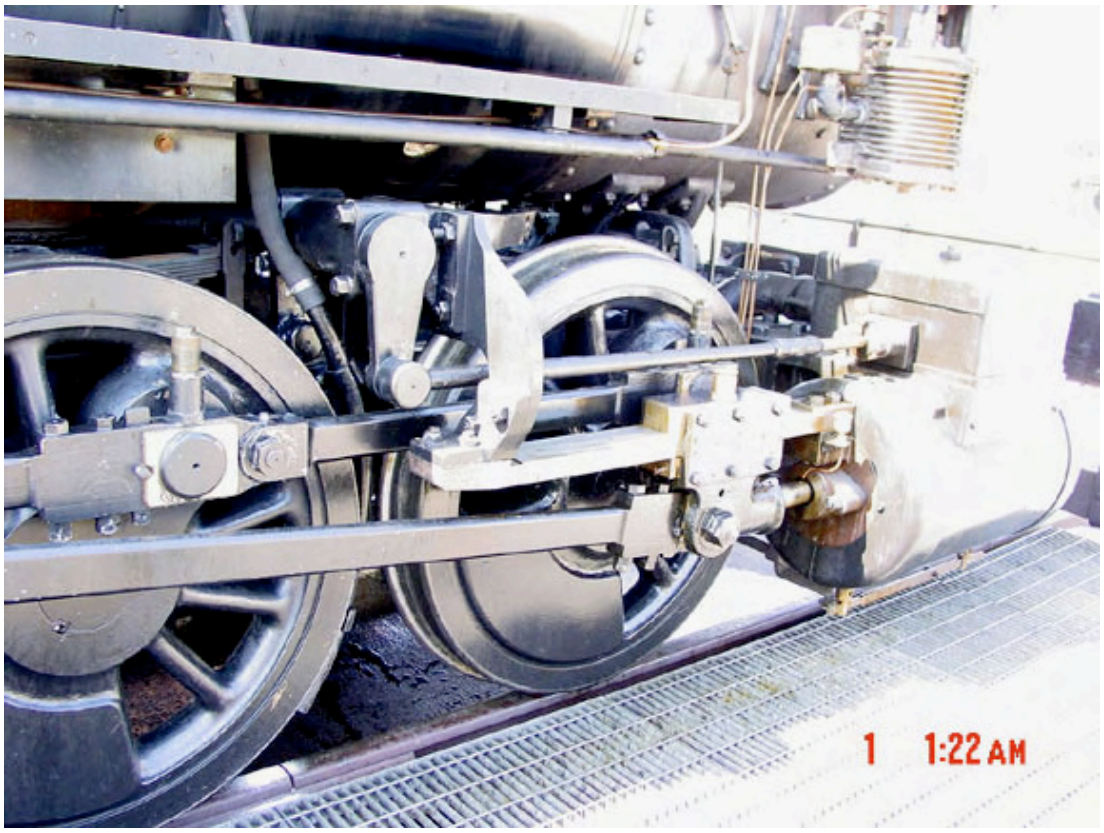


All the Hecla Masons, except "Torch Lake" were scrapped during the WWII metal drives. For 40 years "Torch Lake" would remain mothballed as the line progressed into dieselisation. Offered to the Smithsonian Institute Museum, she was turned down and would remain neglected until moved to the safety of the Henry Ford Museum in 1969. The copper mines also closed in 1969 and with it, the story of the Masons of upper Michigan faded into history.

Here is Torch Lake at the end of her time in upper Michigan, being moved to Greenfield in 1969.



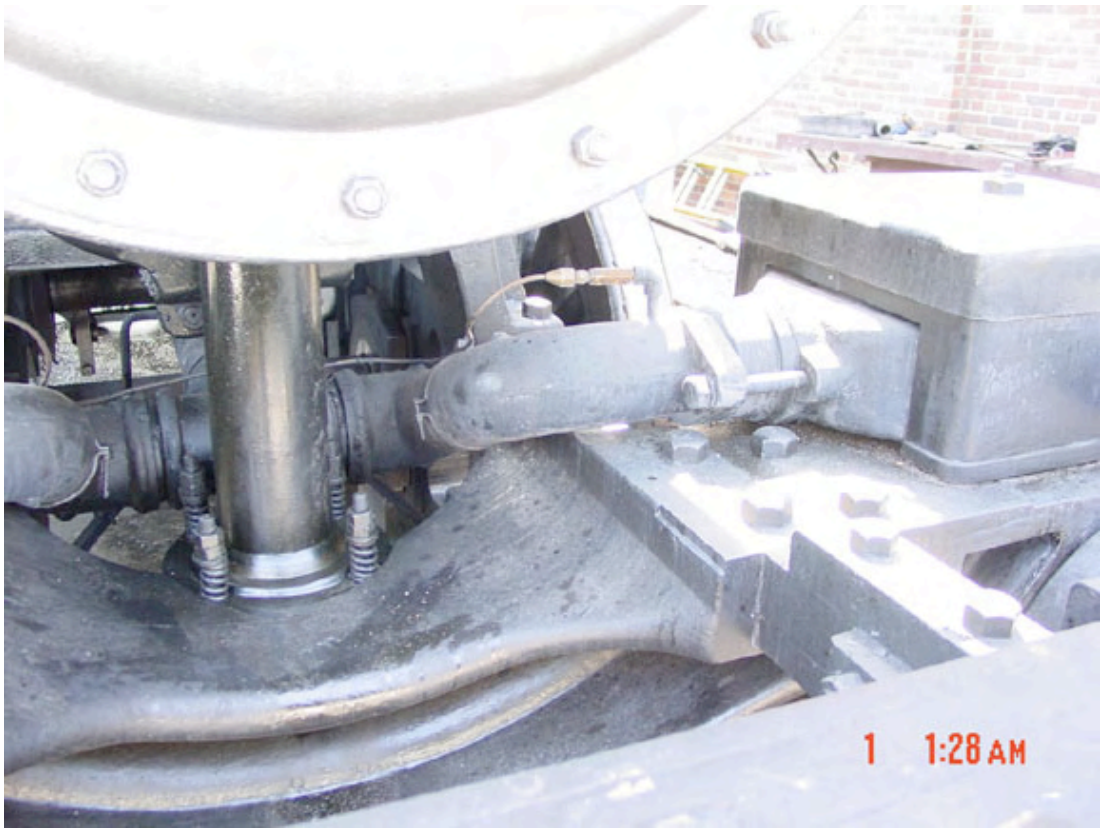
The following photos were taken in 2005, during the Narrow Gauge Convention. Thanks to Rich Schiffman for these wonderful images.


1 1:22 AM


1 1:23 AM

Ah, that beautiful Mason bell rig! An earlier styling than that used on the DSP&PRR.

The Smokebox door, Original Mason style down to the plate!



A view under the smokebox. The steam supply pipe can be seen coming from the middle chassis area, then splitting into a "Y" branch to the cylinders. The shiny vertical pipe is the steam exhaust pipe, which enters the smokebox via a crafted slip joint.

Above the lead driver in this view you can see the steam supply pipe running out of the bottom of the smokebox and heading to the rear where it will enter the chassis through the centre of the truck bearing plate.

A real treasure! This is the disused bearing plate normally mounted to the underside of the boiler directly above the middle drive wheel. Note the vertical edges to the giant casting, which bolt into the sides of the structural support frame running along the boiler sides. The above casting is shown upside down, and would be bolted under the boiler.


3
3
3 10:08 PM


3 10:40 PM

A view over the tender to the backhead. We'll use more of Rich's backhead details in chapter 7. While there are modern fittings in there, a great deal is also original and very close to the DSP versions.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MASON MACHINE WORKS.
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TAUNTON MASS.
3 10:57PM


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3
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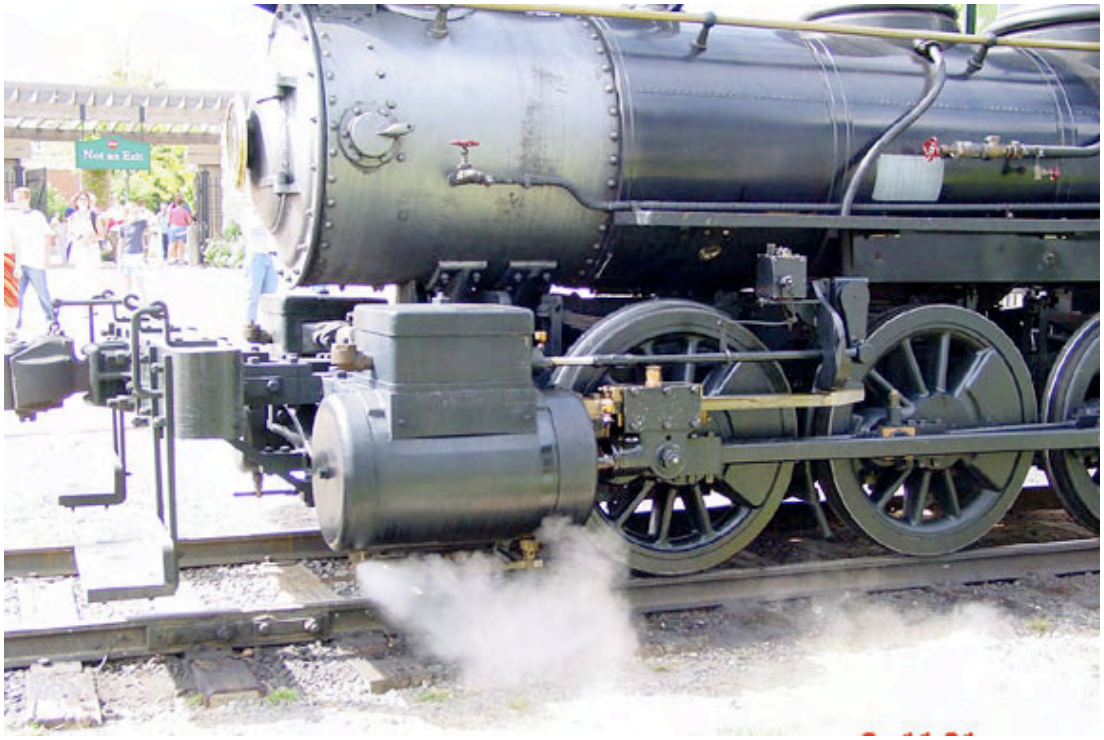
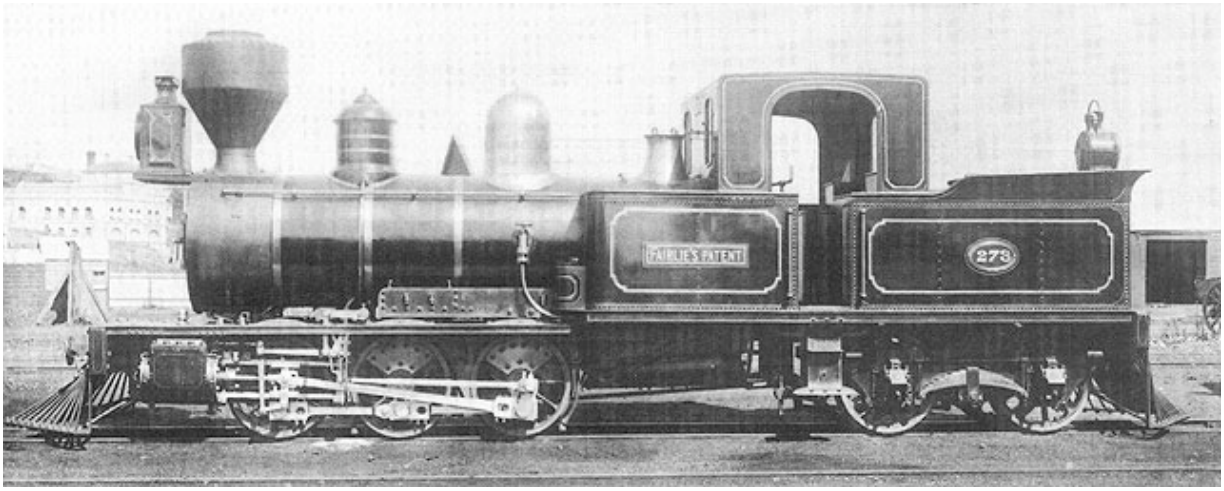

Not an Exit

New Zealand Railways R-28 - The Last Single Fairlie in the World.

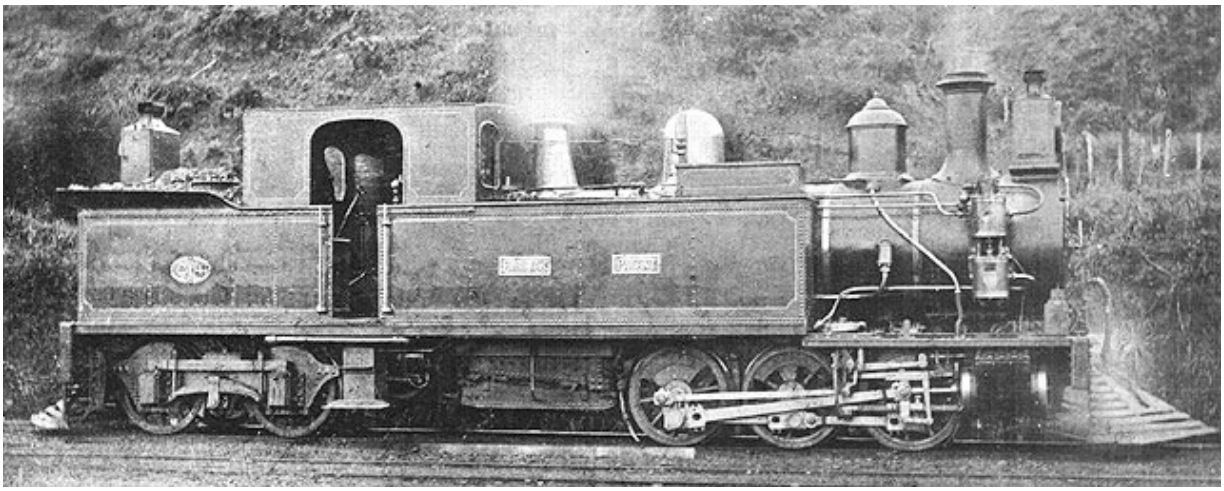
We leave Michigan behind and head to New Zealand to see the last surviving British-built version of the 0-6-4T. This is R-28, the very last surviving Single Fairlie anywhere, and is about as significant historically as the "Torch Lake" above. They are very much twins in many respects, derived using different engineering, different builders, but for the same purpose. Both built as 0-6-4T flexible truck locomotives, and both sharing similar structural and engineering concepts. The NZ R-28 0-6-4T was built by Avonside, Bristol in 1878. Take a note about that. This is the exact same year that Mason began building the DSP&P fleet. From the outset, you can see that Mason's steam supply and exhaust fittings seen above were simpler but more effective than the steam lines seen in R-28. Having said that, the Single Fairlies of New Zealand were locomotives kept in high regard, and were said to be especially successful. The Single Fairlies such as R-28 were regarded much better locomotives than New Zealand's Double Fairlies.

Said to have cost only 2/3rds the price of the Double Fairlie locomotives built for New Zealand, the Single Fairlie was just as flexible, but easier to run and maintain. They were said to cost only a little more than conventional locomotives, and were more adaptable to lightly constructed railways and held the track far better than other British designs. (William Hudson of the Rogers Works in New Jersey would soon prove that rigid framed locomotives could be just as adaptable via the use of balanced suspension.) As for the R-28, she is the sole survivor of the 18 Fairlies built of this type, out of a total of 28 Fairlie locos built by Avonside for NZ. The R class Single Fairlies were the most successful of the various Fairlies used in New Zealand.

Here is an R class (R-273) in "as built" condition.



The R class 0-6-4Ts were the smaller of two classes of Single Fairlie used in NZ. Here is a view of the larger "S" class Fairlie, also built at Avonside. This one is S-214.



As for R-28, after working on the west coast of NZ's south island until the 1930s, she was sold to the Timaru Harbour Board in 1944, and later worked for a Colliery in Reefton nearby. In 1948 she was retired and handed to the town of Reefton for display. Here she remains in a lonely wet place on the south island's west coast, a rare and significant British locomotive.

Now some views of old R-28 as seen today. While not nearly as well kept as "Torch Lake", she is still remarkably original and missing very few parts. I'm sure her day will come when she'll leave this lonely old park and steam once more.

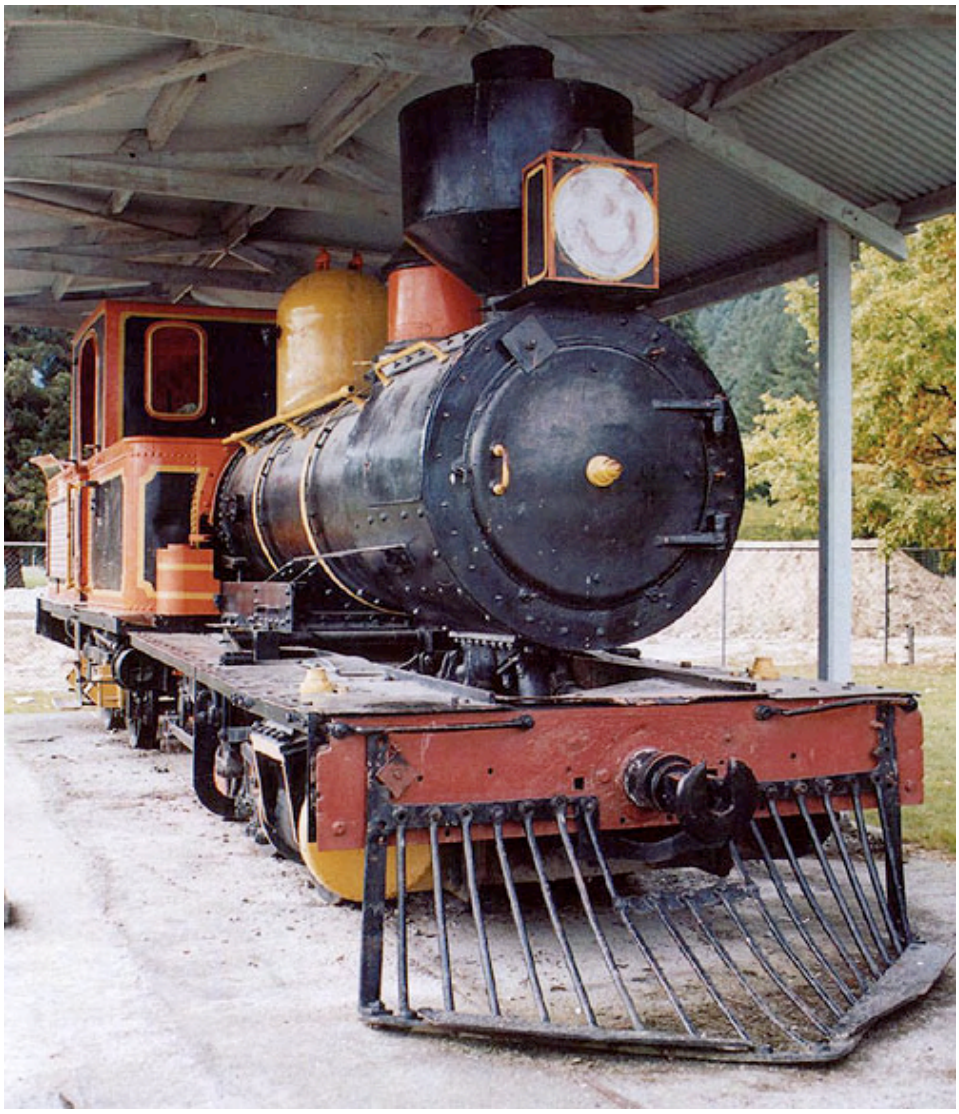
This is the site for the world's last Single Fairlie. You have to know it's in this place to find it.

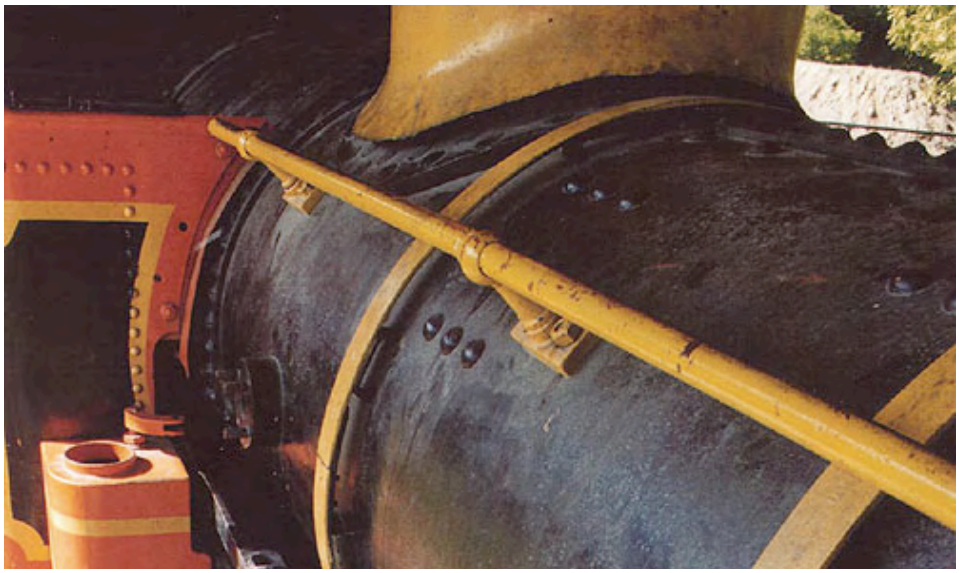
Note the support structure running along the boiler side. You'll see the exact same type of framing the the Mason, except on the Mason the running boards rest atop the framing, whereas on this Avonside loco, the running boards are attached to the power truck, below the boiler frames.


THE FAIRLIE ENGINE

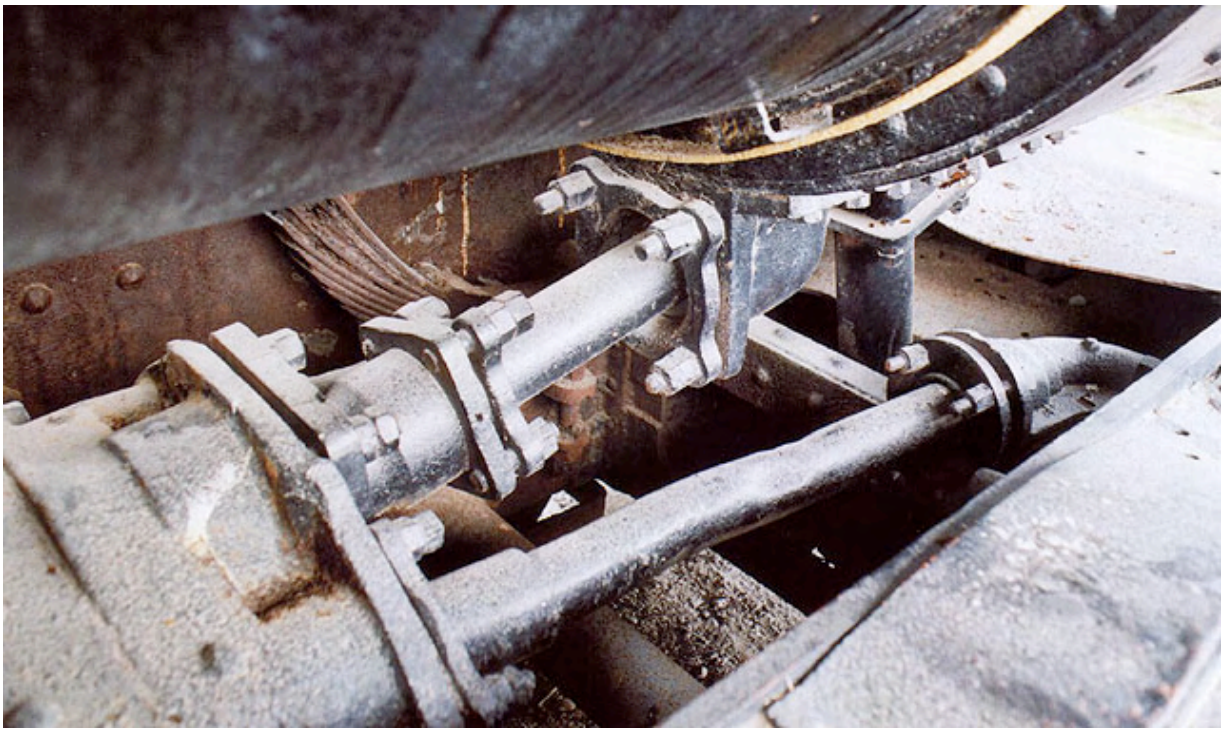
A view of the dilapidated backhead.

Note how the tender enters the cab in the same way as done by William Mason.

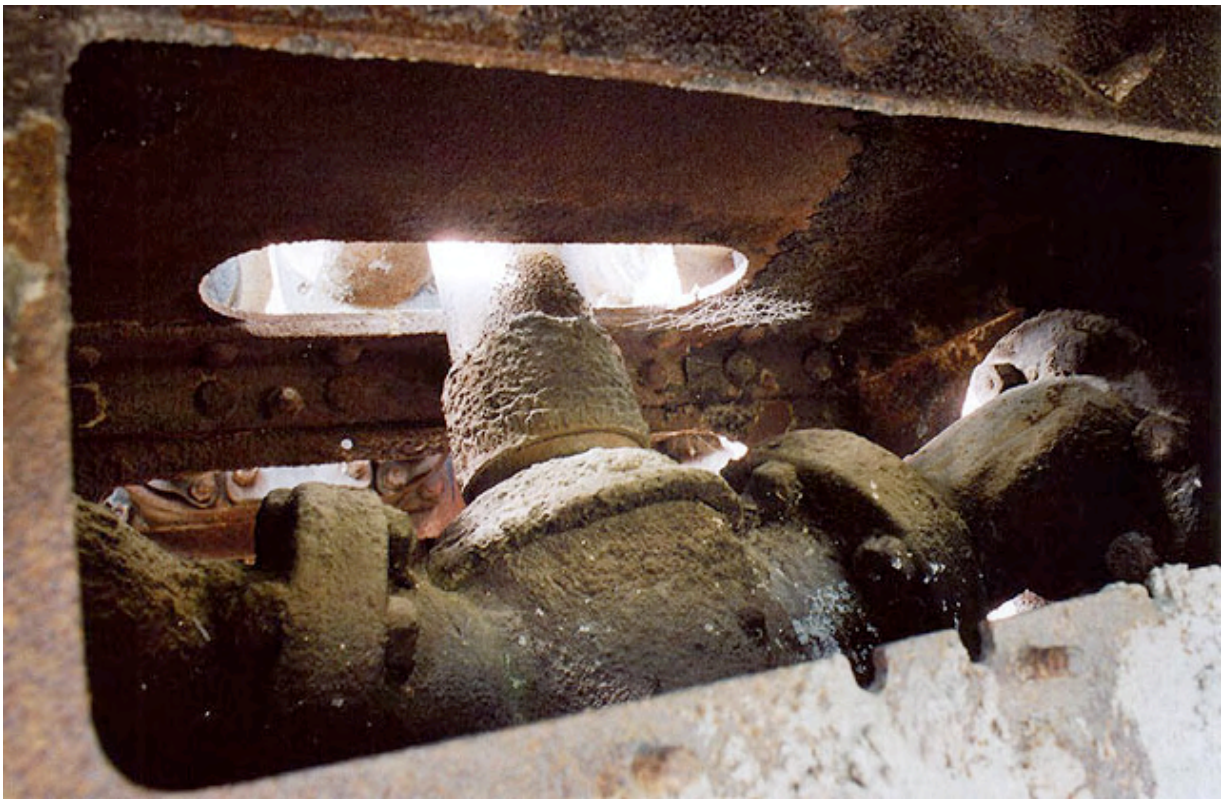




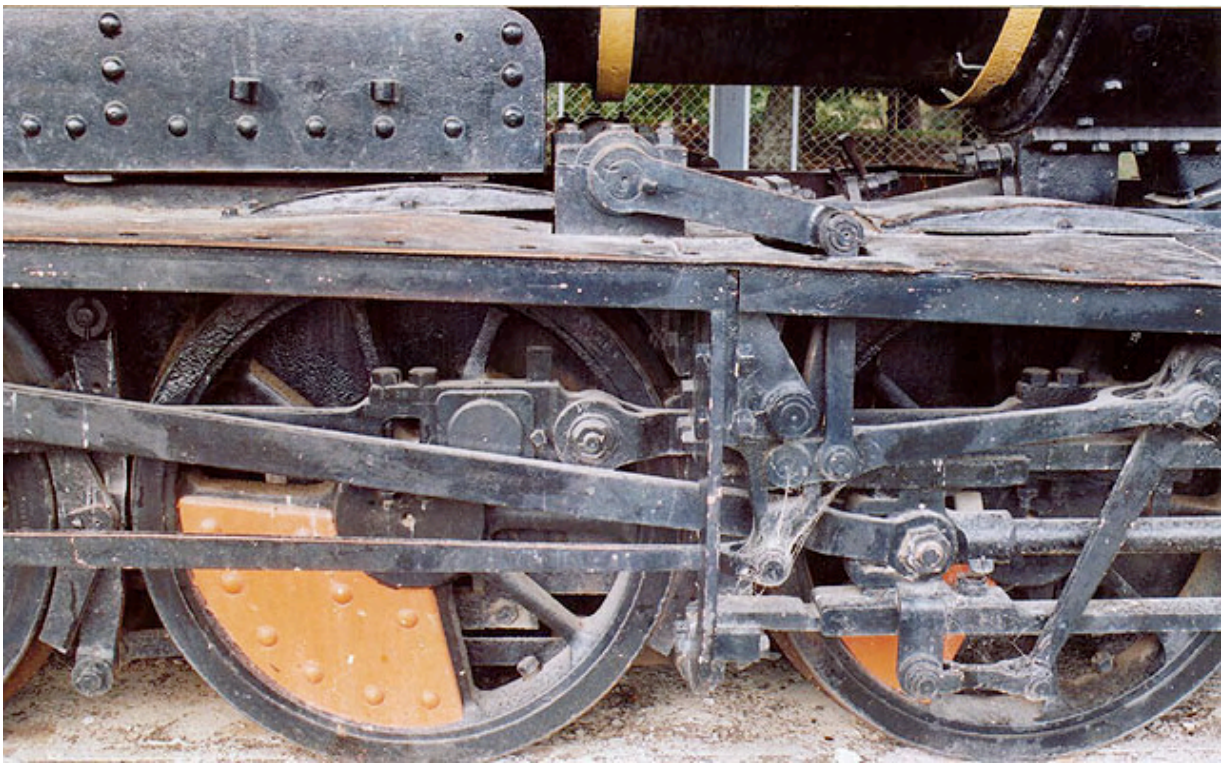
A close up of the boiler framing to which the pivot is mounted. Compare this is the rusty bearing plate of Torch Lake, as seen in Rich's photo above.



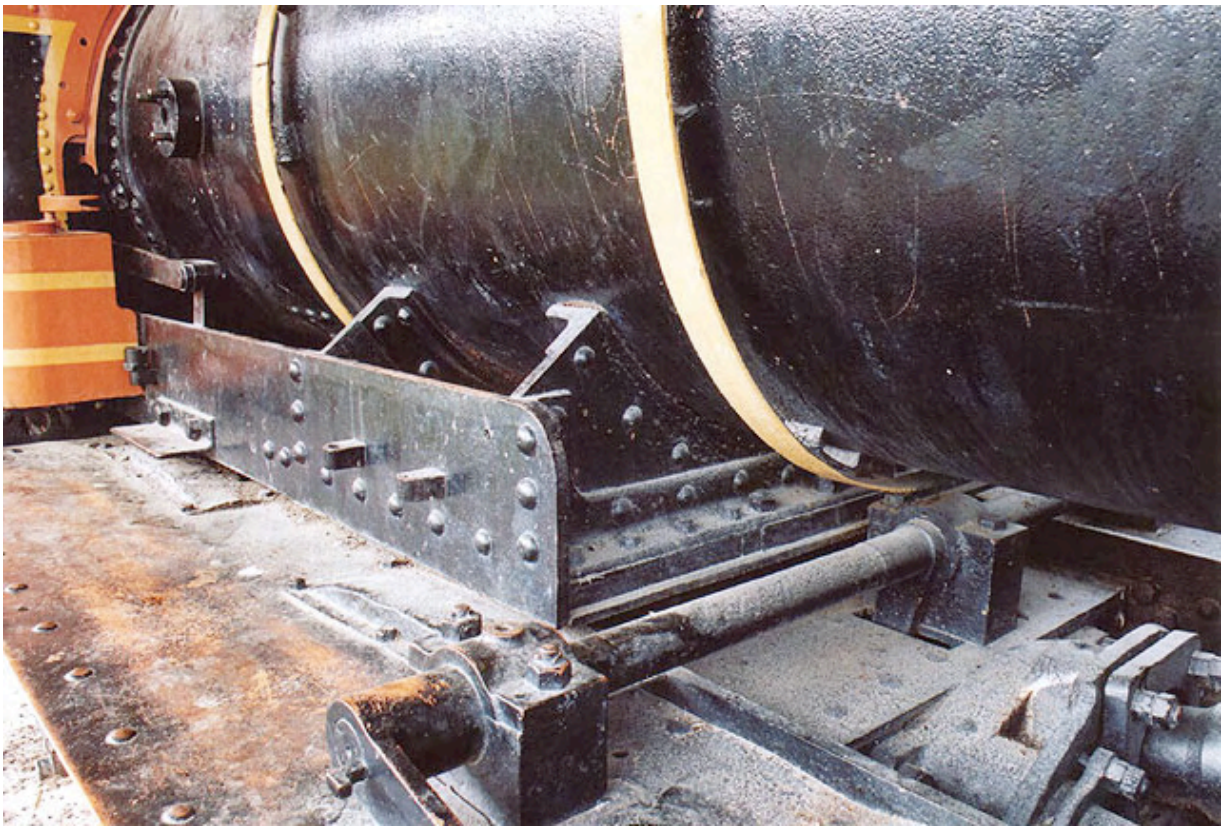
The complex Fairlie steam supply pipes. Steam come from out of the bottom of the smokebox, runs to the rear via two ball/socket joints before entering this manifold to the left-hand side of this picture. Two pipes then exit this manifold and head forward to the cylinders. The manifold being well forward of the pivot means the supply steam line pivots via the ball and socket joints.



A view directly between the cylinders showing the steam exhaust lines from the two cylinders, converging into the vertical pipe to the smokebox above. Note how the vertical pipe exits the chassis deck via an elongated hole. Where Torch Lake uses a slot in the smokebox, this Fairlie's exhaust pipe also pivots via ball and socket joints.

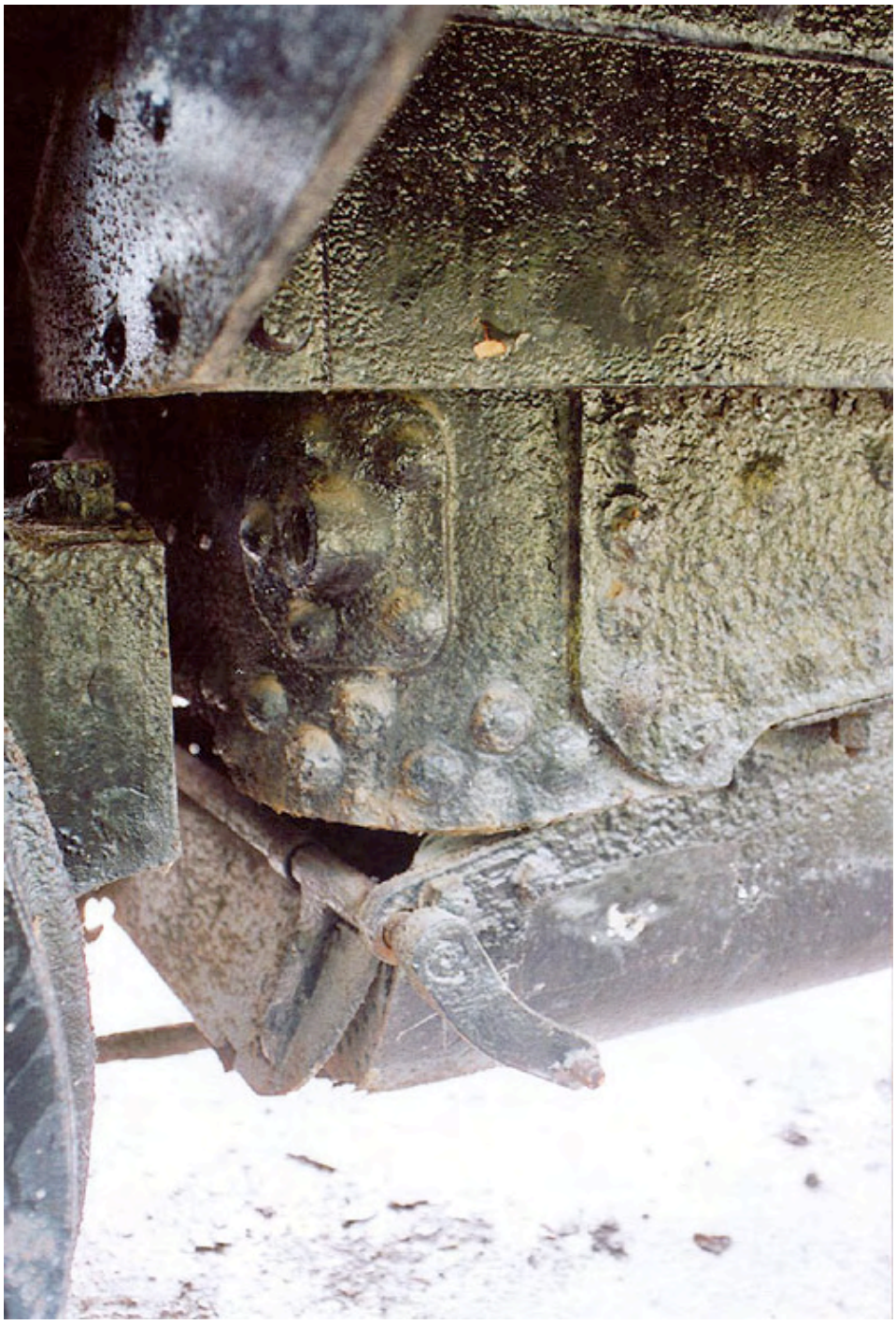


Walschaerts valve gear is used on this 1878 locomotive, much like Mason of that year. Note how the lifting rods remain with the chassis, and are moved via a forward reverse rod that runs along the chassis centre line just above the axles.



In this view you can see how the forward/reverse lever connects to the lifting rods at chassis centre, just forward of the chassis pivot.

To the very rear of the power truck is this sprung sliding plate arrangement. This forces the rear end of the chassis "down" onto the rails.



A view of the front end of the firebox. Note the forward dampers, like we made on our Mason models.

Not a large loco is our R-28. That's me sitting on a great piece of British engineering!

Right, now it's time to move onto the background section and learn more about the Fairlies. I'll hand over to Chris Walas now.