

GREEN ARROW: IS IT THE END? • MID HANTS BUYS STANDARD 4

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EXCLUSIVE: GWR PRAIRIE IN ACTION ON POLISH MAIN LINE



The earlier the better!

The second standard gauge steam locomotive to be built in the UK this millennium was unveiled on 13 July last year. Like the first to be built, it was a replica and again like the first (the Steam Elephant) it is of a prototype dating back some 190 years. Beamish Museum's *Puffing Billy* replica is the latest development in the expanding interest in early railways. The museum's curator of transport **Paul Jarman** discusses the early locomotive lineage and suggests some further subjects for the replica treatment.



This colour engraving, from the book *Costume of Yorkshire* published in 1813, and entitled *The Collier* depicts a miner in front of a colliery scene that features one of Blenkinsop's locomotives. Though the cog drive is not readily apparent, the similarity to the slightly later Steam Elephant is so. BEAMISH

Puffing Billy is the most recent reconstruction in a growing lineage of locomotives dating back to Richard Trevithick's Coalbrookdale locomotive of 1803.

It will almost certainly not be the last either, and it is the place of this article to explore other worthy candidates from the annals of what we might term 'early railway history', to about 1850 when railway development and locomotive science was both well established and increasingly sophisticated.

While much interest is currently being shown in the 'nostalgic' replicas and reconstructions, such as the A1 *Tornado*, the *Clan Hengist*, F5, County, Standard 3MT and Grange projects – which have primarily been conceived to resurrect lost prototypes much loved and admired by enthusiasts in the inter-war and post-World War Two periods (and there is absolutely nothing wrong with this) – there is a developing movement towards 'reconstructive' replicas where the objective is to understand, learn from and interpret to the public the genesis, evolution and occasional demise of steam locomotives that reach far back beyond any human memory.

Gatherings of early railway aficionados and

Left: A total 568 years of history line up on the Beamish waggonway! Pictured from left to right at the County Durham are the replicas of *Puffing Billy* (2006), *Steam Elephant* (2001) and *Locomotion No.1* (1975). BEAMISH

students often provoke lively discussion as to what locomotive should be brought to life again, wrenched from a tranquil existence in a mythically honest and agrarian past into the hubbub and chaos of the microchip age.

Here I suggest perhaps a few of the gaps in British locomotive design in the 'early' period that we might care to consider filling, but it is also instructive to have a look at those key chapters of the locomotive story which we already have, be it original or replica, so as to place our 'gap' suggestions into some sort of context.

It should be remembered that the development of these steam locomotives was largely to satisfy the desire of industry to make money, to reduce transport costs and so increase profit margins. Other than George Stephenson's belief in the railway as a system and a means to open up new opportunities, most saw the steam locomotive as little more than a tool for localised economy and perhaps objects of some curiosity.

In 1803 Trevithick's Coalbrookdale locomotive is said to have set to work at the ironworks there (site of the present Ironbridge Gorge Museum). However, very little is known of this locomotive or understood of its operation.

A conjectural replica of this locomotive has been produced however and can be seen at Blists Hill, part of the Ironbridge museum.

At this point it is important to refer back to the notion of 'standard gauge', as of course in this period no such standard existed. However I have classified locomotives as such where the gauge and proportions that they were originally built to are there or thereabouts our standard of 4ft 8 1/2ins.

Trevithick's second railway creation appears in 1804 at Pen-y-darren in Wales, this time much better documented, and contemporary to his third locomotive, built in Gateshead to test the water for potential sales in the North East of England where coal mining and the development of the waggonway was reaching a state of some sophistication.

Whether it was actually built by Trevithick himself seems unlikely (more likely is that the Gateshead engine was built by Trevithick's Tyneside agent, John Whinfield with input from a former Pen-y-darren foreman), but a replica of the Pen-y-darren locomotive has nonetheless been made possible by the survival of drawings of the presumed similar Gateshead engine, this replica being a product of the Museum of Wales and star of the Railfest 200 celebrations in 2004.

Interestingly this replica has been constructed so that its operation might be converted from running on plateway rails to edge rails, the type of track originally employed being another confusing factor (in terms of the gauge) in the interpretation of early locomotives.

So far we have one designer and two replicas. At this point I would suggest that we have our first significant gap in our early locomotive narrative, an example of the Blenkinsop/Murray engine.

The first of these was tried in 1812, having been constructed by Matthew Murray under the guidance of colliery engineer John Blenkinsop.

Incidentally both of these individuals hailed from the north east, further reinforcing this region's importance in the story of railways. Their locomotives (of which there were two) used Blenkinsop's idea of a cog drive, this engaging into a rack set alongside the running



The replica Steam Elephant on test in November 2001. BEAMISH

rail and so providing the propulsion, a predecessor of the established mountain rack railway understood by most enthusiasts.

The locomotives had two cylinders set vertically into the boiler and the overall appearance was not dissimilar to the Steam Elephant, to which we shall return later. The recreation in replica form of one of these locomotives would be fascinating exercise given the form of drive. The system appeared to work well enough and this type of locomotive set the precedent for some 13 years to come. The Middleton Railway, once home of the original examples, would seem an apt place to locate such a reconstruction.

Our next two steam locomotives are products of the North East and see the first development of what might be termed 'practical' travelling

engines (to use the phraseology of the time).

In 1813 (again a date of not a little uncertainty) *Wylam Dilly* began operation on the Wylam waggonway serving Wylam colliery in Northumberland. In 1814 *Puffing Billy* followed. Despite numerous setbacks and modifications, these two products of colliery engineer William Hedley and a foreman blacksmith called Timothy Hackworth were to survive at work into the 1860s, by which time they were preserved for posterity in the Royal Scottish Museum in Edinburgh and the Patent Office (later Science Museum) in London.

Puffing Billy was considered to be of sufficient significance to North East railway history that Beamish commenced work on a replica, *Puffing Billy 3* being completed in early 2006. There is a further *Puffing Billy*, *Puffing Billy 2*, a replica



The replica of *Locomotion No 1*, the pioneer Stockton & Darlington locomotive, in action on the 1825 Pockerley Waggonway at Beamish Museum. A deliberate policy of allowing lineside vegetation and wild flowers to grow is implemented at Beamish, to some extent disguising the modern bullhead rail in use and also attempting to better recreate what early mineral railway may have looked like. BEAMISH

constructed in the early-20th century for the Deutsches Museum in Germany, this example still being on display in Munich today.

Inevitably we would stumble across the name of George Stephenson, though perhaps much earlier than many would have appreciated. His first locomotive appeared in 1814 and was designed for use upon the Killingworth waggonway, though with little success.

Undeterred however he fought off the issues crippling development at this time, such as the Napoleonic Wars (which reduced the prices of horses – an alternative motive power – considerably) and dwindling capital for designs

which often failed, returning with a type of locomotive that might be described as the first 'class' of engine rather than individual endeavour. Five of these were supplied to the Killingworth system, one to Llansamlet and three to the Hetton Colliery system between 1814 and 1822. The design culminated in the famous Stockton & Darlington Railway *Locomotion No 1* of 1825 (and sister locomotive *Hope*, also of 1825).

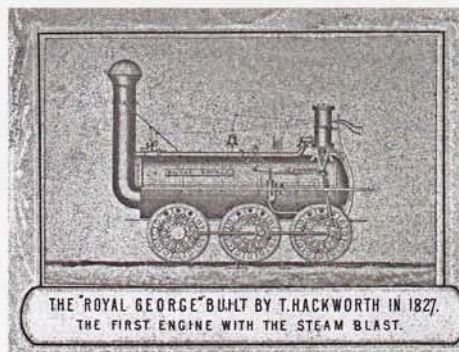
The earlier locomotives had axles connected by chains, coupling rods later being substituted. Some examples also employed a form of suspension that utilised the boiler pressure and a

cylinder adjacent to each wheel (supporting that end of the axle) to create a 'steam spring'. In such a form a replica would be fascinating and a worthy addition to Beamish's fleet.

However, one of this series does survive, named *Billy*, and is part of Tyne & Wear Museum's collection on display at Middle Engine Lane, North Tyneside. A far more instructive exercise might be an archaeological survey of this engine, along the lines of that famously and widely reported exercise carried out on *Rocket* by Professor Michael Bailey and John Glithero at the NRM in York.

The next locomotive is another that exists only in replica form is the engine that came to be known as the Steam Elephant. It is thought that the original was built for the Wallsend Colliery, east of Newcastle in 1815 and was designed by William Chapman upon the instruction of John Buddle, the leading colliery engineer of the day (earning him the nickname 'King of the coal trade').

Beamish completed a replica of this engine, based on nothing more than sketches, watercolours and a very good oil painting, in 2001, with 'Nellie' being launched on 21 March 2002. The outline of this locomotive is very similar to that of Blenkinsop and Murray's locomotive, though the drive is through the driving wheel treads directly onto the rail head.



The *Royal George* built by Timothy Hackworth in 1827, the first engine with steam blast, taken from a compilation poster produced for the Stockton and Darlington railway celebrations of 1875. BEAMISH

So far I have made only one suggestion for replication, that of the Blenkinsop/Murray cog locomotive. I now make my second suggestion – Timothy Hackworth's *Royal George*. Hackworth had been appointed to the position of engineer on the Stockton & Darlington Railway, which operated with a mixture of rope, horse and locomotive haulage. Stephenson's earlier designs (*Locomotion No 1* and *Hope*) had been of mixed success and a design was required to convince builders of public railways that locomotive haulage on part or all of a railway line was feasible.

In 1827 this engine appeared, an 0-6-0 to Hackworth's own design, ponderous and slow but also effective and reliable. Two vertical cylinders drove the rear axle, the weight on the fragile rails being spread by the six driving wheels.

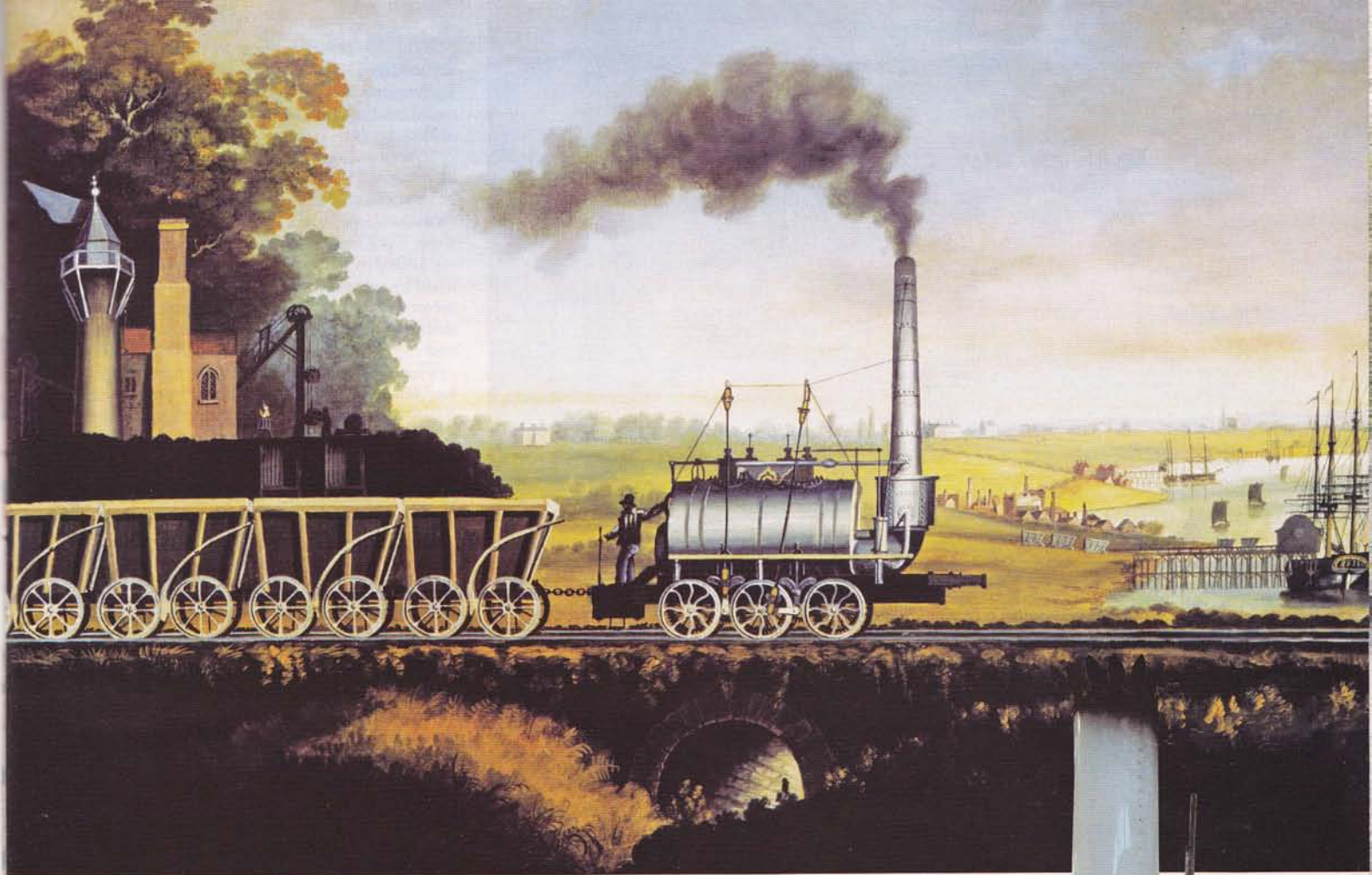
Variations of this design were produced as late as the 1840s, examples being national firsts in Canada and Russia. Similar types appeared in 1836 (*Bradyll* – preserved at Shildon) and 1845 (*Derwent* – preserved at the Darlington Railway Centre at North Road on the route of the S&DR).

I therefore propose that *Royal George* is a significant gap in the operating replica, or static original, story. This makes it a very attractive candidate for replication.

Perhaps the National Railway Museum at



The replica Rainhill Trials runner-up *Sans Pareil* seen in steam at the Locomotion museum at Shildon, its spiritual home. The original machine is displayed in the entrance building adjacent to the goods shed seen here.



Above: This painting, believed to be the oldest known railway painting in the world, depicts 'Steam Elephant' at work on the Wallsend Waggonway. It was using this technically competent view that made possible the construction of a working replica at Beamish. BEAMISH

Right: The National Railway Museum's working replica of Stephenson's *Rocket*, seen here at Shildon in 2004. PAUL JARMAN

Shildon would be suitable host for such a goliath. It was considered by Beamish during the selection process that eventually saw *Puffing Billy 3* produced, the more remote geographical proximity to Beamish and lack of original to copy being deciding factors in its rejection. That's not to say somebody else couldn't build it however!

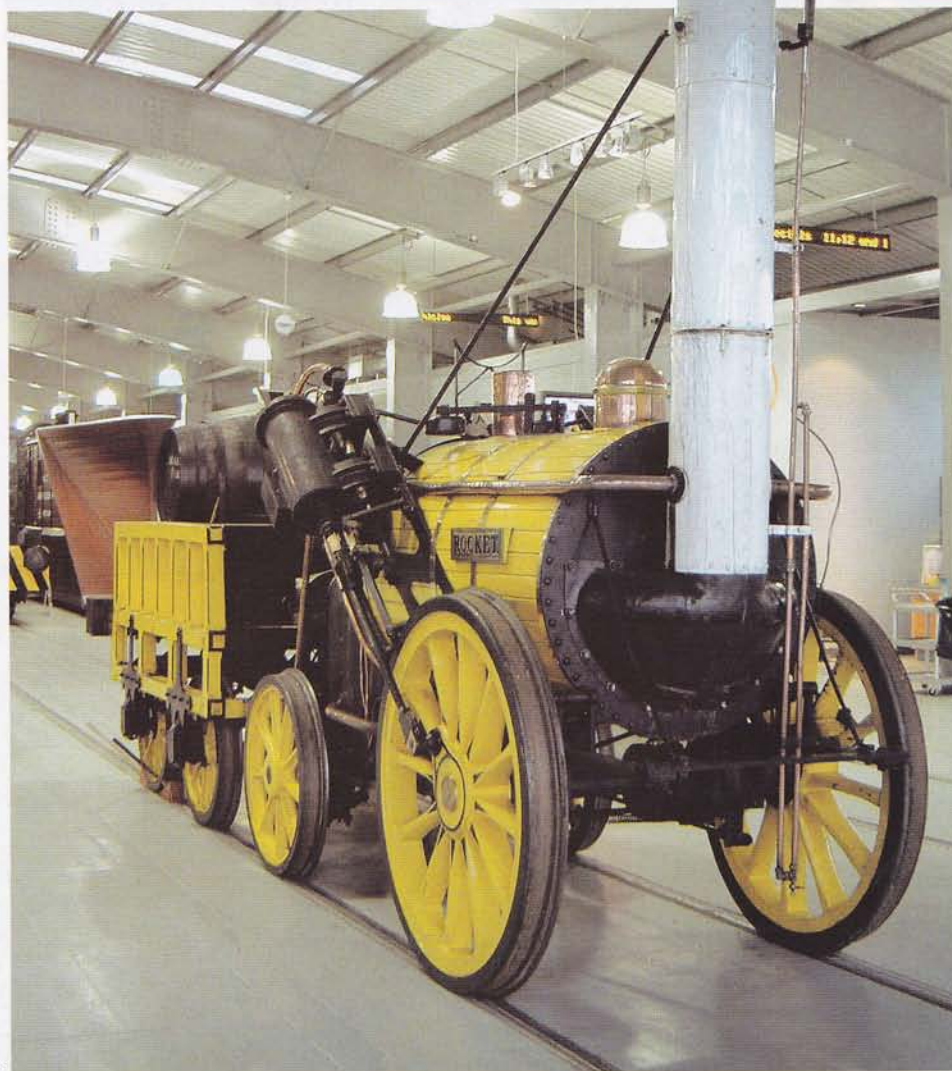
We now reach a rich vein of survivors and replicas, with the 1829-built *Sanspareil* (Timothy Hackworth), *Rocket* (George, though more likely Robert, Stephenson), *Agenoria* (Rastrick of Stourbridge) and *Invicta* (following hot in their tracks in 1830).

The original *Sanspareil* is displayed at the National Railway Museum in Shildon, alongside a working replica.

Fellow Rainhill trials contender *Rocket* is also well understood and well replicated, the original being displayed in the Science Museum in London with a working replica being based at the National Railway Museum in York.

Robert Stephenson & Hawthorn also constructed three replica working *Rockets* in 1929, one of which survives at York, and another in the Henry Ford collection in the USA.

All of these are based on *Rocket's* as-built appearance so there may be some value in recreating a working replica of it in its latter, industrial, guise. ▶





An early wooden waggonway being reconstructed at Beamish during early 2006. A substantial foundation with Jarrah sleepers (all hidden from view) was employed, so as to ensure the long-term durability of this reconstruction. BEAMISH



Above: The Beamish wooden waggonway completed. In due course it is hoped to operate this exhibit periodically, revealing to the public and scholars alike some of the mysteries of operating a wooden railway. BEAMISH

Below: The route of a former waggonway at Greenside, near Gateshead. Formed from deposits of waste coal and other mineral waste, this embankment has been ablaze for many years, as is evident from the rising smoke and pungent smell along the route. Note the fence posts – the bases of these having burnt away over recent years! Once a common sight across the region, most material remains of these routes have now been reclaimed or removed. PAUL JARMAN



Its history is well understood and demonstrating it as it ran on the Brampton Railway in Cumberland until 1862 would make an interesting comparison to the NRM replica at York.

It would also recall the story of 'main line' locomotives being sold to dealers and into industry that was once common and is so ably recounted in Alfred Rosling Bennett's delightful work *The Chronicles of Boulton's Siding*, first published in 1927 and very much written first hand by someone who had seen early locomotives cascaded into industrial use and still being gainfully employed into the 1860s and 70s.

The replica *Novelty* in Sweden (its original builders being John Ericsson and John Braithwaite) should not be overlooked at this point, the replica being an occasional visitor to the UK.

Agenoria is extant at York and a replica would be of little significance to the story of locomotive development as we currently understand it. Likewise *Invicta*, of the Canterbury & Whitstable Railway. However, detailed surveys of both of these remarkable survivors would be of considerable benefit to our knowledge of them and their significance to our narrative.

The year 1829 is also notable for another very poorly known locomotive, a locomotive that if replicated would provide us with an almost unequalled spectacle of early railway motive power. *Perseverance* was built in 1832 for the Dowlais Iron Company in South Wales, following in the footsteps of Trevithick's 1804 Pen-y-darren engine, and being an 0-6-0 geared plateway engine.

Constructed by Neath Abbey, *Perseverance* featured steeply inclined cylinders at the footplate end, driving a crank axle located between the first and second wheeled axles, this in turn being geared to drive both a pinion wheel which engaged with a rack between the rails, as well as the first two wheeled axles. The third axle was linked by coupling rods to the second axle, giving a mixture of geared and adhesion all-wheel drive. Another distinctive feature of this technically demanding design was the provision of two chimneys, an unusual and highly distinctive feature which was the result of the need to hinge them to run through a tunnel, a single hinged chimney still being out of gauge.

Running on plateway rails, *Perseverance* must have made a startling sight, and not a little commotion. Rebuilt in 1840 the locomotive was scrapped or sold by 1848.

There is a growing momentum for a replica of this fascinating engine to be built, though the lead-time for any such project will invariably be lengthy, likewise the accumulation of sufficient funds to start work on an accurate replica.

We can only hope that it is achieved and that one-day we will be able to study the operation of a large and complex plateway locomotive. It is also significant as dating from an purely industrial railway, in an era where the main line or public company was becoming established elsewhere.

Returning to the 'mainstream', another missing locomotive of note is *Northumbrian*, built by Stephenson's for the Liverpool & Manchester Railway and being a centre player in the opening day celebrations in 1830.

This locomotive is a development of *Rocket*, with the cylinders being pitched at a near horizontal angle (rather than the highly inclined form as found originally on *Rocket*). *Northumbrian* was very much leading the way to production line locomotives, the next significant engine in this particular lineage being *Planet*, a replica of which can be found in

the Museum of Science and Industry in Manchester.

After *Planet* came the yet more successful *Patentee*. So was born an off-the-peg, reliable, robust and versatile locomotive of a style we might call modern and inspiring several manufacturers into producing similar designs. So the railways of the world were opened up, opening up the world as they went. And so we reach the end of this brief look at what we might describe as the early period.

Note that I have ignored developments and coverage abroad, solely dealing with the situation in the United Kingdom during the 1803 to 1848 period.

What is surprising is that there are relatively few gaps worthy of the effort to require filling. Perhaps this is a little disappointing or perhaps it shows how well this era is actually served. Consider other locomotives on the periphery of this period – the Great Western's *North Star* (1837), the Liverpool & Manchester's *Lion* (1838), the LNWR's *Columbine* (1845) and *Cornwall* (1847) and the Furness Railway's 'Coppernob' (1846). From the period 1803 to 1848 we can count some 15 survivors and eight replicas, with a further two being desirable and two possible.

That makes for interesting contemplation – consider that from 1848 to 1870 there are only 13 standard gauge survivors and two (complete) replicas in existence. This really makes this mid-era the railway equivalent of the post-Roman occupation of Britain Dark Ages. Maybe this should and will be the next klondyke for railway study and research?

Beamish has established a comprehensive library of early railway literature, underpinning the research to bring about the three operating replicas at the museum. It has also proven that these early designs can be made safe enough and functional enough to survive daily operation throughout the museum's high season (generally March to October).

While we accept the need for continuous



During its first steaming at Beamish, Patrick Keef is seen attending to *Puffing Billy*'s fire outside the waggonway locomotive shed at Beamish. After this photograph was taken efforts were made to 'weather' the locomotive's appearance, darkening the bright pitch pine boiler lagging and oak frames and generally softening the very new appearance. BEAMISH

brakes (we use a twin line air system, which is both highly effective and also discreet), modern boiler specifications (essential!) and operating practices, visitors who watch and ride behind the locomotives (*Locomotion No 1*, *Steam Elephant* and *Puffing Billy*) are enchanted by their apparent crudeness, stately (though pedestrian) progress and almost total lack of noise (though *Puffing Billy* has a distinctive 'chuff').

There is currently no plan to build further

locomotives for Beamish's 1820s waggonway (we are now focussing on the 1870s industrial locomotive collection), but we may consider building further rolling stock and enhancing the waggonway environs.

There is also the prospect of hosting a gathering of replica locomotives, to create an unrivalled spectacle of early railway history.

We would be very interested to know if there is a demand within enthusiast circles for such an event... □

The replica of GWR broad gauge 2-2-2 *Fire Fly* at Didcot Rasilway Centre has filled a massive gap in railway history. FRANK DUMBLETON

