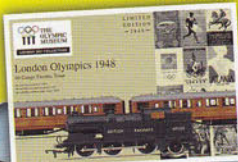


WIN OLYMPIC GAMES HORNBY COLLECTORS' SET



HERITAGE RAILWAY

Issue
166

THE COMPLETE STEAM NEWS MAGAZINE

August 2 –
August 29, 2012

Royal rescue!

*Tornado's rapid repair while
hauling 510-mile Royal Train*

Gresley P2:
all systems go

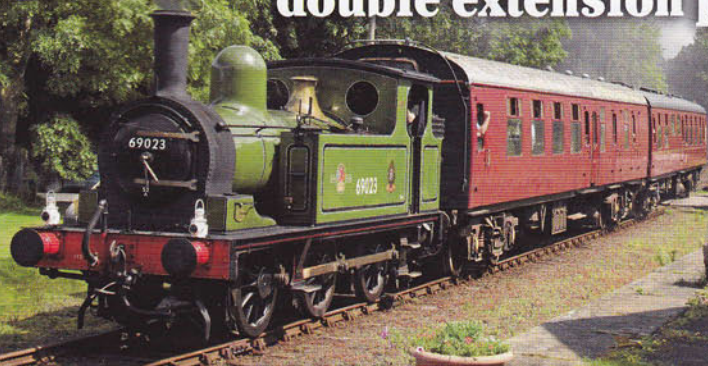
NRM in Great Central talks

Severn Valley steam crisis 'solved'

Winston Churchill and 9F for Great Dorset Steam Fair

Wensleydale launches
double extension push

Exiled A4s
now on move



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One for the pot

Steam locomotives come in all shapes and sizes. **Alan Barnes** reports on the restoration of one which is different to the average.

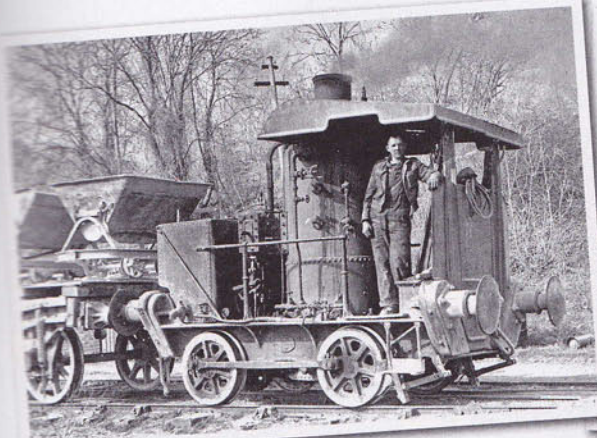
In 1871 the Dorking Greystone Lime Company took delivery of a diminutive steam locomotive which had been supplied by T H Head, an engineering firm in London. The 0-4-0 vertical boiler quarry locomotive had been built by Head Wrightson & Co Ltd and was based upon its standard 'Type 1' design. Of particular interest was the one piece cast iron frame, which forms a bedplate on to which everything else is mounted – an extraordinary piece of pattern

making, moulding and casting. From 1873 Head Wrightson moved on to conventional plate frame assemblies for the few locomotives it built.

Although Head Wrightson had developed its various standard designs, it was extremely rare for a locomotive to be produced without having some modifications carried out at the customer's request during the building stage. The Dorking Greystone Lime Company was no exception and had requested that its new

engine be fitted with sprung buffers in place of the 'standard' dumb type and in addition a 300-gallon water tank was to be fitted. The records reveal that these extras added the princely sum of £10 to the original cost of the locomotive which brought the total price to £445. Interestingly the locomotive never carried a Head Wrightson plate so the works number is unknown. The company's original order book for that period was lost and we will probably never know its factory number.





Far left: Running with its 4th boiler in the 1940s, note cab roof and substantial end supports to stabilise the tall boiler.

Left: In service with Dorking Greystone in 1949.

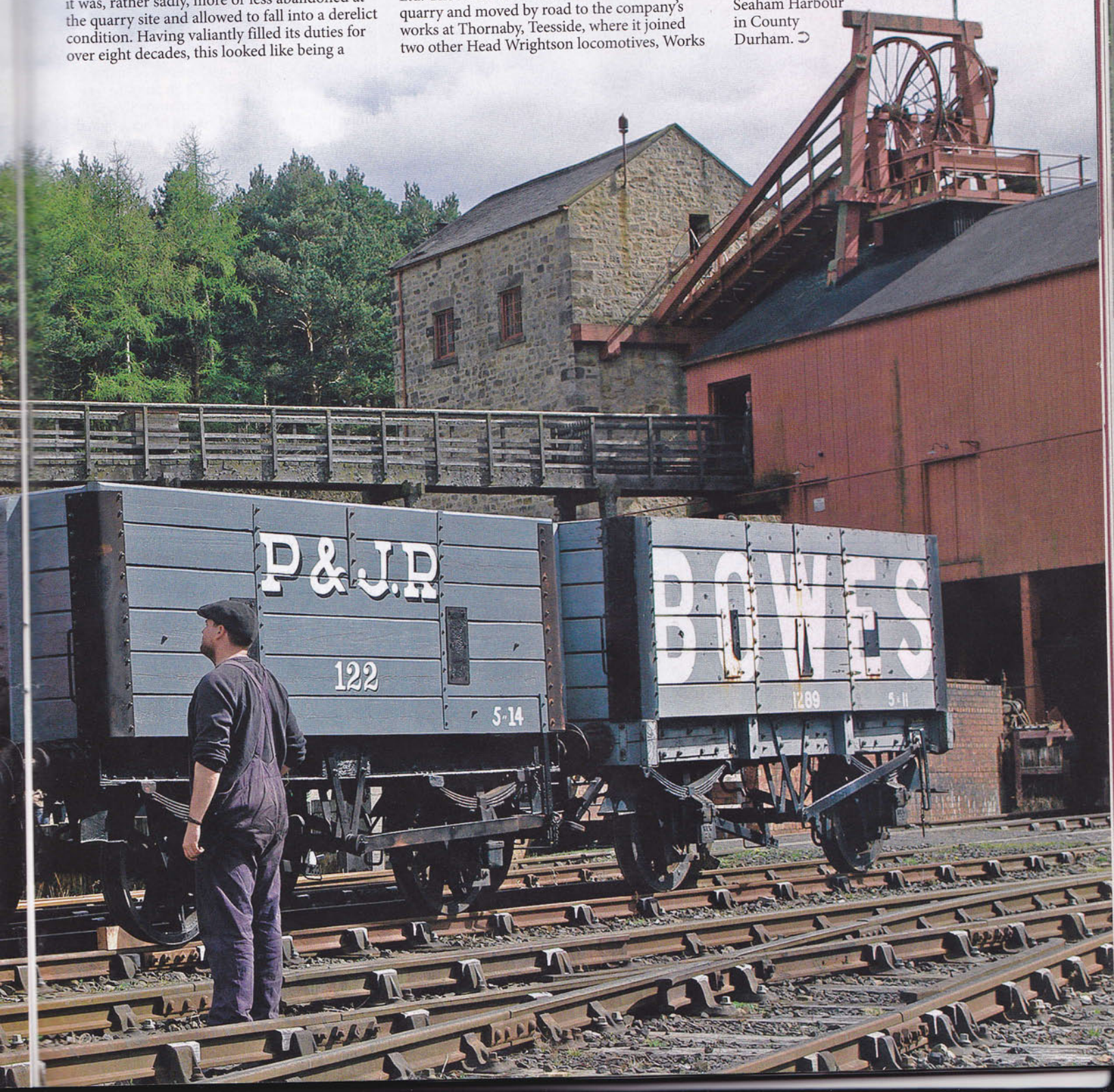
Below: Beamish Steam Fair 2012. ALAN BARNES

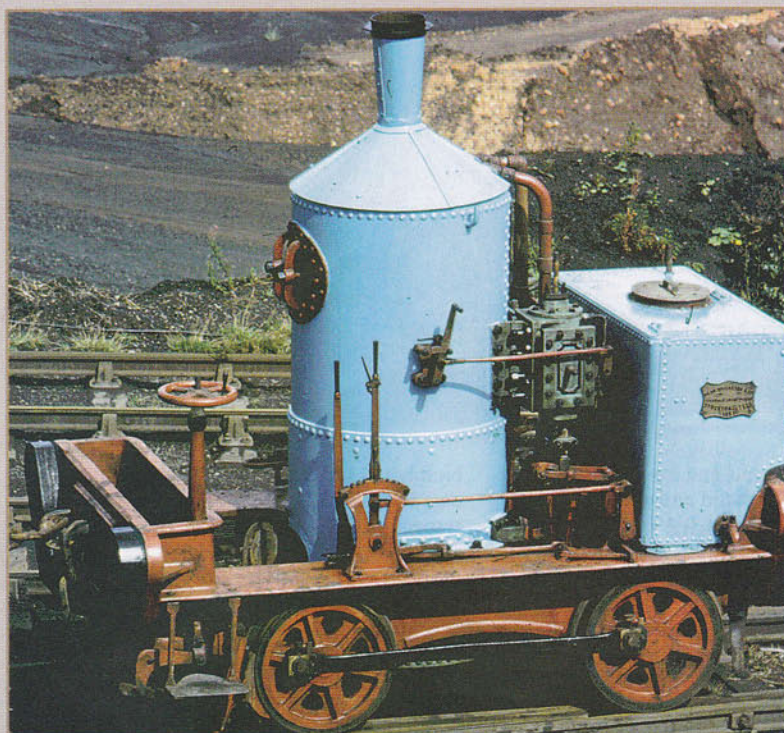
Derelict condition

The Head Wrightson 0-4-0 was to spend the next 81 years working at the Betchworth quarry until finally being withdrawn from service in 1952; and despite having given sterling service it was, rather sadly, more or less abandoned at the quarry site and allowed to fall into a derelict condition. Having valiantly filled its duties for over eight decades, this looked like being a

somewhat ignominious end for the locomotive. However help was at hand and a few years later in 1960 the remains of the 0-4-0 were re-purchased by the current incarnation of the company that built it, Head Wrightson Teesdale Ltd. The locomotive was recovered from the quarry and moved by road to the company's works at Thornaby, Teesside, where it joined two other Head Wrightson locomotives, Works

Numbers 21 and 33, which dated from 1870 and 1873 respectively. Unlike its sister engine these two had worked more locally having spent their operating lives at Seaham Harbour in County Durham. ➔





Left: As restored by Head Wrightson in the 1960s.

Below: Early steam event at Beamish with a very much patched up to run *Coffee Pot* in the foreground.



Compressed air

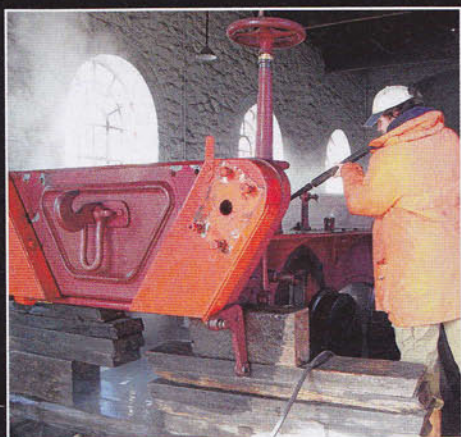
The Head Wrightson apprentices were given the task to restore the recovered 0-4-0 to what was thought at that time to be its original appearance but during the work they also converted it to run on compressed air for demonstration purposes. A similar restoration was also carried out on Works Number 21. In 1962 the locomotive was offered to Beamish but it remained with Head Wrightson until 1970 when it was moved to British Steel Corporation's Consett Ironworks in County Durham. At this time the locomotive was still without the roof and handrails which had been fitted during its quarry days.

When the 0-4-0 was finally moved to Beamish, further restoration work was undertaken and it was repainted in a green and black livery and steamed on a few rare occasions. In 1982 Beamish was benefiting from the Manpower Services Commission schemes and one of the projects which was undertaken was a further overhaul of the Head Wrightson locomotive which was returned to its 1940s appearance. By this time it had picked up the nickname 'Coffee Pot' and the locomotive was turned out in a splendid new maroon livery. Unfortunately there is no record of her original livery other than a thick coating of lime dust. The refurbished locomotive was unveiled at Beamish on May 31, 1984, and enjoyed a few years' service on the museum's rail network. However regular steaming put a strain on the locomotive and its age was beginning to tell and by the early 1990s the decision had been made to take her out of service and the locomotive was then stored in the colliery engine shed.

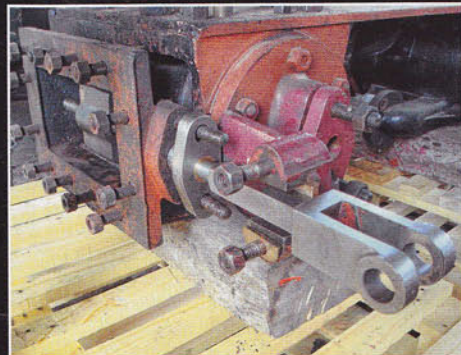
According to transport curator Paul Jarman: "A key problem was the mounting of the cylinders and crankshaft directly on to the boiler with numerous leaks developing through the oscillating movement of the valve gear and connecting rods and the difficulties in ensuring that the mounting bolts remained secure." It was clear that for *Coffee Pot* No 1 to return to active service, a complete and costly restoration would have to be undertaken.

Thanks to the availability of some substantial funding from both the Heritage Lottery Fund and private donors, work began on the rebuilding of the locomotive at the end of 2006. A complete strip down and removal of the boiler and cab was followed by some vigorous steam cleaning to remove years of accumulated grime and to allow an assessment of the major components to be made. The frames were lifted from the wheels and an examination of the journals and bearings revealed that they were in very good condition. During 2007 a boiler survey on this locomotive and also on Works No 21 was carried out by Graham Morris to enable a new set of boiler drawings to be prepared. Discussions on the design of the new boiler continued for some time as this would be a key part of the project, not to mention an expensive one.

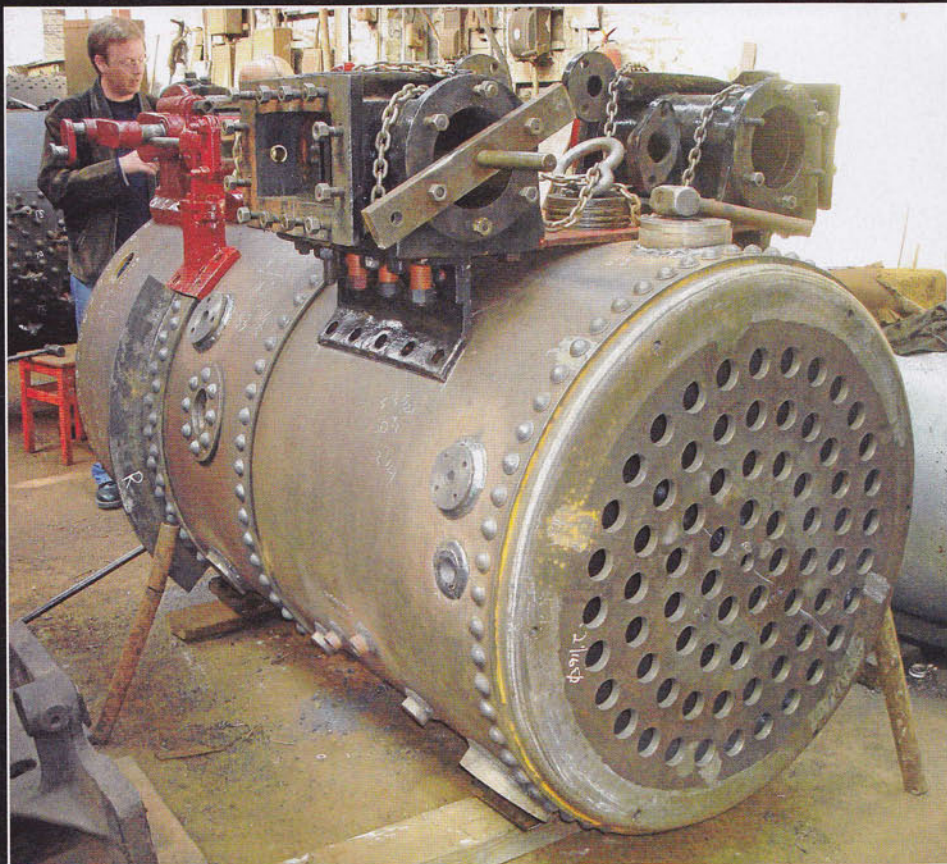
In the meantime Dave Young, a new volunteer to Beamish but a time served engineer, had begun the process of overhauling all the moving parts, machining, bushing and re-boring parts where necessary, taking many of them back to his own workshop where they received his expert attention. He also reported to the project team at the end of 2007 that real progress was being made as the regulator quadrant had not only been cast, but he had also collected the casting, completed the machining and it has been painted. He just needed the rest of the locomotive to fix it to!



Paul at work steam cleaning the dismantled frames – curators do sometimes get dirty.



The cylinder assembly during overhaul by David Young.



Trial fitting of the cylinder and crankshaft assemblies to the boiler at Newtons.

Patterns for new castings

For those parts which were deemed to be beyond repair, Dave also made up patterns for new castings to be made at the appropriate time. The details of just the work undertaken by Dave during 2007 gives some indication of what is required to get a steam locomotive back on the rails:

- Dismantle, examine and clean various parts
- Remove old paint
- Machine slide valve faces
- Machine and spot face bolting surfaces
- Make and fit new stainless steel valve rods
- Make studs and overhaul existing studs
- Make and fit cleading
- Overhaul seized valve gear and make new s/s pins, nuts and keys
- Make and fit steam cylinder cocks
- Make brass water connection and steam pipe
- Pack glands and remove old ones
- Paint and rub down
- Re-assemble regulator, machine and adjust
- Make pattern for regulator bracket
- Make drawing for regulator bracket modifications
- Dismantle brakes and grinding spindle links
- Dismantling and preparing disengaging lever cross rod
- Foundry visit and visit to measure locomotive
- Making and boring two new brake rods to match originals
- Machining brake arm and making pin bush
- Making pillars studs etc for regulator handle quadrant
- Boring brake hangers and making and fitting bushes

The new cast slide valves were machined and the slide rod was turned to 15/16 inch from the original 1 inch to remove the wear and heavy grooving. The rods also required straightening and the square section that slides in the rod

guide was made true. As Paul recalled: "David and I discussed bushing the casting of the steam chest where the rod passes through and this is to be a collared bronze bush retained by the gland packing. We were very aware of the dangers of over re-engineering the engine unit – a part of a precious historical exhibit – however we also needed to balance that against the requirement for safe and reliable operation with the minimum of wear to the original and new components."

Progress being made

As work on various parts of the locomotive was completed, they were put on display at the colliery engine shed to show visitors to the museum the progress that was being made. Among the patterns which David made was one for the new safety valve which was used by North East Die Casting at Wolsingham to cast the valve to the required British Standard. Once the casting was ready, Vince Allen Engineering of Hetton le Hole completed the machining ☺



Following the 1984 overhaul, Coffee Pot is once again in its 1940s guise.



Posed with No 17. BEAMISH MUSEUM



At the colliery in July 2010. BEAMISH MUSEUM

and made up and fitted the internal safety valve components. The valve was later tested as part of the boiler to obtain a CE mark for design and construction.

Rewheeled

Attention was also paid to the chassis which had been steam cleaned and the thick build-up of grease on the spring hangers was removed. Firstly the inner sides of the frames were primed and then painted red and then the outer sides, wheels, axles and underside of the running plate received similar treatment. Once this was completed the frames were re-wheeled to enable the upper works and buffer beams to be installed.

Getting into the 'guts' of a steam locomotive which is over 100 years old involves a certain

amount of detective work as well as regular engineering. As Paul recorded on his project blog at the time: "We found that two mysterious inlets are fitted into the steam chest casting, these causing some confusion to David and myself. They appear to be for drain valves to be fitted, and pipes run down the boiler and clear of the crankshaft to substantiate this. It is also suspected that *Coffee Pot* will be a very wet engine, as the steam pipes and cylinders are not lagged. However, inside each steam chest is a copper pipe connected to the inlet, indicating it is for lubrication. How the oil travelled up the pipe is not clear, nor is it likely it was pumped there from the mechanical lubricator fitted in the 1970s and refitted in 1984. As there are now 'brass onion' displacement lubricators fitted to the cylinder covers (and these were installed in

the 1970s) plus the regulator live steam lubricator, oil will be plentifully available. It is possible that the 1984 work failed to realise the lubricators were a 1970s addition, so fitted additional lubricators as a precaution. As the 1871 spec does not feature the steam chest lubricators or drains (whatever they are!) we will not refit them now. Operating experience may prove this to be incorrect, but for now we shall have to wait to find out." Operating experience did subsequently provide the answer – they were drains and refitting them considerably reduced the amount of water exiting via the chimney when the regulator is opened!

Israel Newton & Sons was commissioned to build the new boiler once the final specifications had been agreed and work started in late 2008.



Returning to Beamish March 2010. BEAMISH MUSEUM



Pouring metal for new castings at North East Castings.



First fire, March 30, 2010. BEAMISH MUSEUM



Beamish Steam Fair 2012. ALAN BARNES

By this time a schedule of final works had been agreed and this would include steam testing and the fitting of the boiler into the frames. This would be undertaken by experienced engineer and traction engine restorer Vincent Allen. Meanwhile orders had been placed for various other parts and fittings which included a set of replica works plates, the pattern for which was made by Graham Redfern after exhaustive study of available photographs. By the beginning of 2009 *Coffee Pot No 1* was mechanically around 95% complete and until the new boiler was ready not a great deal further progress was possible although Paul and David did spend some time reuniting the water tank with the chassis, choosing a particularly cold and snowy day to carry out this task.

Newtons completed the basic boiler shell and to this the crankshaft casting and cylinders were offered in order to enable final alignment of blind bushes to be determined. These bushes would prevent problems in caulking any joints in the vicinity of mechanical mountings as well as being a steam tight solution to fastening these quite substantial structural components. The method had been applied, and well proven, with Beamish's replica locomotives 'Steam Elephant' and 'Puffing Billy'. Interestingly, this was the only modification to the original boiler design, as redrawn by Graham Morris, and the boiler was subsequently fully CE marked – a testimony to the original and now anonymous designer in 1871.

As Beamish had limited engineering facilities in late 2009 (a situation that is currently being remedied with the development of the new Regional Heritage Engineering Centre), the decision was taken to contract the final assembly of the locomotive to Vincent Allen. The rolling chassis and mountain of parts was subsequently delivered to his Hetton workshops, shortly followed by the boiler, which had

received its examinations and a hydraulic test in Bradford. The first step was to assemble the engine unit on to the boiler, fit the top angle ring which was a new casting, smokebox and fittings, make the cladding sheets and prime everything. A cradle was made to enable the boiler to be steam tested, for both the insurance company (RSA) which was acting as the notified body for the new construction and also Beamish's own insurance inspector. This was carried out on November 5, 2009, an appropriate date for lighting the first fire, and subsequently the final assembly began.

'Complete'

The boiler was placed into the frames and much adjustment was needed to ensure that the boiler mounted gear drive engaged correctly with the drive gear on the front axle. This stage of a restoration always reveals a myriad of jobs that have to be carried out, but there does come a day when the project reaches a stage that might be considered 'complete', as Paul recalls: "In February 2010 I called in at the workshop and was delighted and astounded to see *Coffee Pot* all but complete. For years you think about, even dream about, the project, how it will look, how you will fund it and all of the tiny details that must be made or attended to, and it is therefore a moment of extreme satisfaction to see the manifestation of all of this stood there, looking very very real."

Coffee Pot was moved to Beamish in time for the start of the new season at Easter 2010. An in-frames steam test was carried out for the insurance company; after that the engine was free to explore the colliery railway system at the museum. "It took us some time to work out all of No.1's foibles, how best to fire it, drive it and to carry out certain modifications and adjustments. An early modification that was carried out was to fit a chimney damper, as the

loco is not fitted with a conventional ashpan. The engine's fire was very hard to control without any form of damper in place and with a Salter balance safety valve it had a tendency to blow off a lot."

Regular use

Since the restoration was completed, the engine has been in regular use at Beamish and has also visited the Tanfield Railway, Bowes Railway, National Railway Museum and Severn Valley Railway. Paul believes it to be the UK's smallest working standard gauge steam locomotive, certainly of a production series, weighing in, as it does, at a modest eight tons.

Paul's current project is now drawing to a conclusion, the restoration of 1877-built Stephen Lewin 0-4-0ST No.18 (known as 'Lewin'), which has followed a very similar road to the restoration of No.1. "Once we have No.18 completed and commissioned this summer, the next in-house project will be the restoration of the other Head Wrightson locomotive, No.17, which will largely take place in our own workshops. The challenge we face now as a museum of 40 years is to ensure the long term sustainability of working exhibits, such as *Coffee Pot* and *Lewin*, and one of our current projects is to develop staff and workshops to enable us to do this. Beamish also has several contract restorations in hand, including the overhaul of the locomotive and carriage once owned and used by the Duke of Sutherland. *Dunrobin* and the Duke's coach are currently undergoing restoration work which should enable them to operate in 2014 – adding yet more variety to our Victorian steam scene at Beamish." ■

■ Latest news on the transport collections at Beamish can be found on Paul's blog at <http://beamishtransport.blogspot.com>