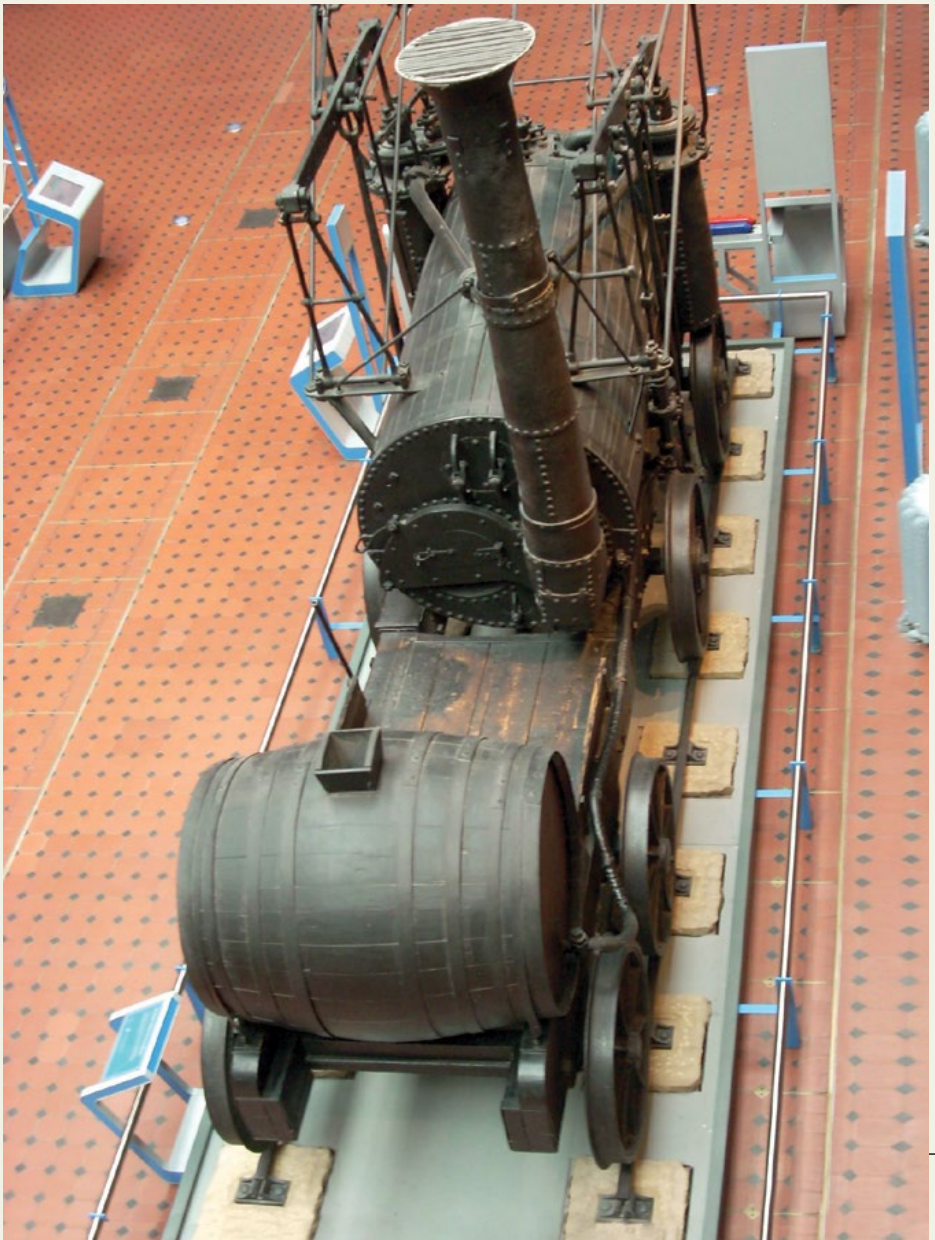
THE MEN FROM THE MINISTRY

A 'TEUTONIC CHRONICLE' PRESENTED BY GEORGE SMITH

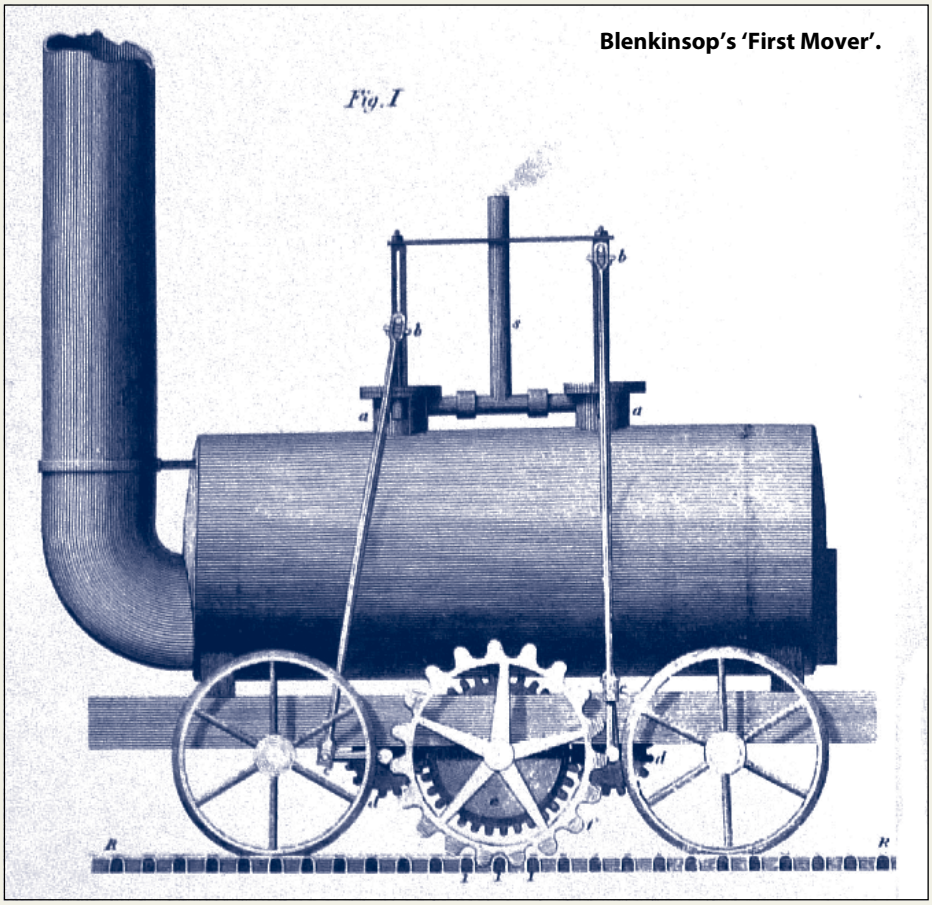
Hetton Colliery as it would have appeared in 1827. Inset are portraits of Ernst von Dechen (left) and Karl von Oeynhuasen (right).



Wylam Dilly **at the National Museum of Scotland. When the German engineers saw it, unlike today, it still had eight unflanged wheels.**

Less than a year after the first official appearance of *Locomotion* in 1825, two men with European accents turned up at the workshops of the Stockton & Darlington Railway (S&DR) at New Shildon, complete with packing cases of measuring equipment. They were there at the request of the Mining Department of the Prussian Ministry of the Interior, which had given them instructions to assess the applicability of British railway technology and operational practice to the Prussian state. They set about the task with the vigour of youth: Karl August Ludwig Freiherr von Oeynhausen was 31 and his colleague Ernst Heinrich Karl von Dechen just 25. To these men, New Shildon would have seemed the modern equivalent of a working holiday at Cape Kennedy. Everything was new, dynamic and thrilling. They had a tight schedule and tried to cram as much into the few months they had in Great Britain as was possible. To this end they travelled the length and breadth of the country, dropping in on as many railways, both public and private, as could be fitted in. New to the railway business and therefore unsure of what was important and what was not, they carefully examined everything they laid their hands on and, in this, they were nothing if not thorough.

In the body of the subsequent report they produced there are whole pages devoted exclusively to the structure of wagon wheels, which is fascinating, instructive and illuminating assuming you are interested in wagon wheels. Nothing was too small to be included. They calculated the average speed a horse moved along rails when pulling three

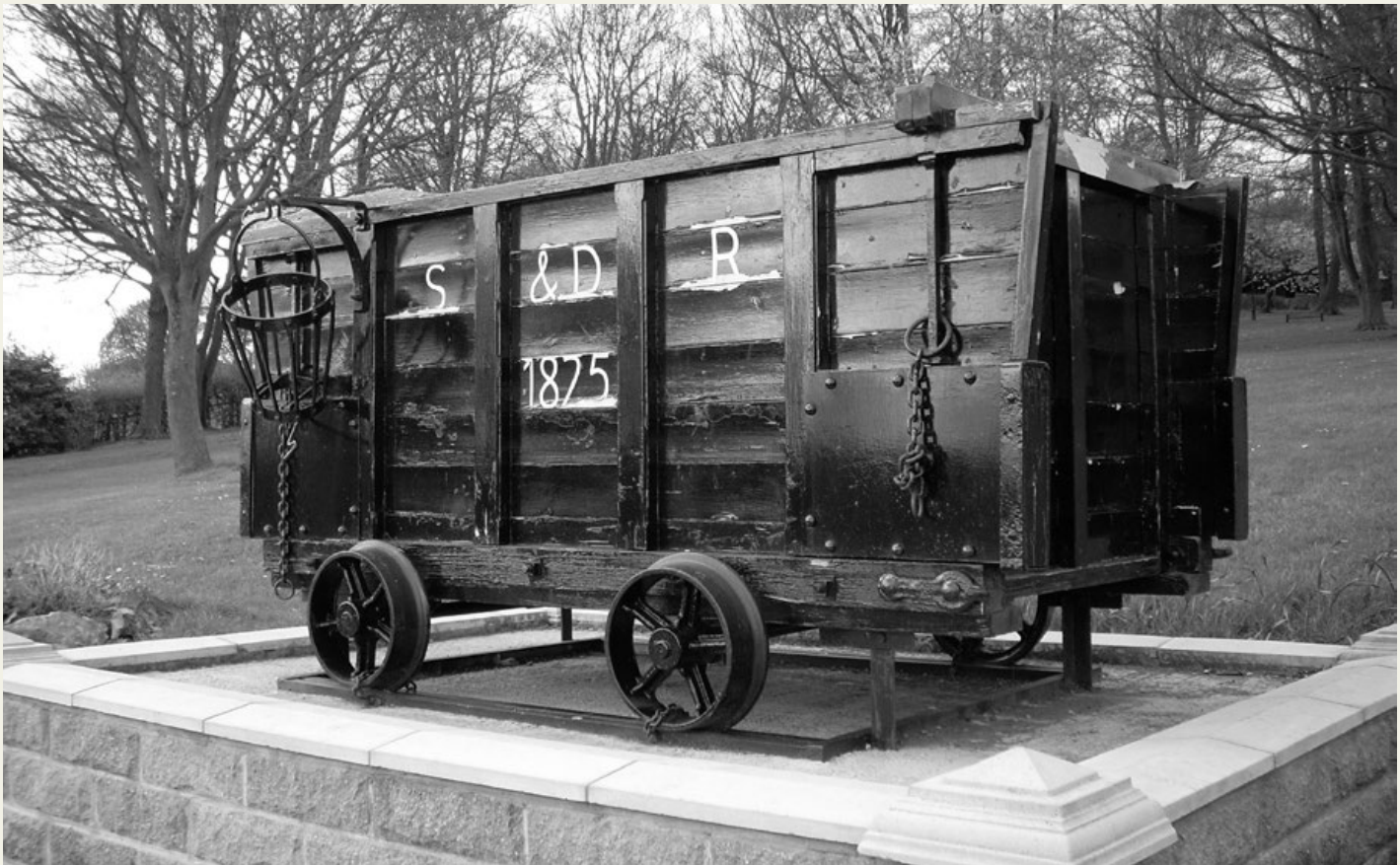


Blenkinsop's 'First Mover'.

loaded coal wagons (three feet a second): the exact dimensions of all standing inclines, going as far as to pace out the distances involved themselves to verify the information they had been given – eg length of Brusselton Incline on the S&DR 152ft 8in on the east side and 89ft 8in on the west: gradient 3ft elevation for every 100ft distance ascent (west), 2ft for every 500ft descent (east). They examined the structure and durability of all types of rails used, used their measuring callipers on wheel axles and brakes and made detailed drawings of everything potentially useful. Along the way they assembled a wealth of information about pre-Victorian railways which, more than a century later, was translated into English for the Newcomen Society by a man called Ernest Forward. As a glimpse of what railways were like at the beginning of the railway age the report takes some beating.

The information gathered fell into three distinct categories: long-established railways, newly operating railways and railways under construction. In addition to information on plant and equipment, the report also covered every aspect of railway management from construction to operation, including the relative cost of everything involved. The one thing they didn't do was provide accurate dates and times of where and when they were working at any one time. All we know for certain is that they were resident somewhere in England from the summer of 1826 through to spring the following year. Since it would have been impossible at that time to simply flit on a whim from one end of the country to the other, we can assume the railways were visited in a sequential manner based on their proximity to each other, packing up all their equipment on to pack horses and wagons and moving on to the next nearest railway. They worked from north to south as this is how their report is laid out. There was logic to this. The age of the steam railway began in the north east, so both the development of the locomotive and railways in general could be easily gauged using Durham and Northumberland as their starting base.

Let us assume, therefore, they began their adventure at Newcastle, transferring their gear to a keel boat heading up the Tyne, with the first stop Wylam Colliery. That they visited Wylam is in no doubt since they noted there was only one working steam locomotive on the Blackett tramway there, an eight-wheeler (presumably *Wylam Dilly*), which was still plodding along pulling wagons on antiquated 'L'-shaped cast iron plate rails; the move to conventional edge rails had therefore yet to take place. The men from Prussia didn't linger long at Wylam; they must have considered the tramway outdated and unworthy of detailed attention. While the layout of their report suggests that the Stockton & Darlington Railway (S&DR) was the next port of call, in terms of operational history, the private railway from Hetton Colliery to Sunderland was the logical chronological step after Wylam and it's worth considering what they found there first.



1825 S&DR coal wagon.

At some time during the spring of 1827 they went to Hetton Colliery. They went there to see how George Stephenson's locomotives, which had been working there for at least five years, were coping. Hetton is a village eight miles south of Sunderland. Beneath it, at the beginning of the nineteenth century, were vast reserves of coal; so much in fact that local coal-working survived through to the Government-led demolition job of the 1980s. In the previous year the colliery had produced a million tons of coal, all of which had been moved to collier boats on the River Wear, the main destination London. In terms of efficiency the two men were well impressed by what they saw. They described the railway as "the finest in England" after the S&DR. The similarity was unsurprising. It was built by George Stephenson's brother Robert to George's original design yet by modern standards it was a convoluted affair, consisting of a tortuous sequence of inclined planes with only the odd locomotive-worked section. One notable absentee was the presence of horses. If they were used at all at Hetton they can only have been restricted to local haulage at the coalface as there is no mention of them taking part in the transfer of coal from pithead to boat.

This gives credence to the argument, often made, that it was George Stephenson's intention that this little railway would act as a showcase for steam locomotives, particularly his own, at a time when the rest of the nation was losing interest. Six of George's engines had been supplied to Hetton Colliery, although the foreign visitors found only two to be operational, both confined to the first mile and a half of the railway from Hetton to the foot of an inclined plane.[1] The problem in using locomotives more widely, it seems, was the drastic effect they were having on the cast iron rails.[2] These, funnily enough, were also Stephenson's invention. He had patented them in conjunction with their manufacturer, William Losh of Newcastle. Reports of regular rail damage caused by his engines at Hetton weren't lost on Stephenson and, to his credit, he argued the case for wrought iron rails to the proprietors of the S&DR despite the personal financial loss which resulted.

Regardless of locomotive problems, it is evident from the tone of the report that the two Germans considered the railway at Hetton a major achievement. The railway worked well and the operation was financially sound. The authors of the report noted that despite including seven inclined planes in a railway only eight miles long it still managed to convey coal from pithead to quayside in less than two hours. The engineers walked all eight miles themselves, making notes on everything they saw, and then commented at length on the various methods used for transferring coal from wagon to ship. They were particularly taken by the cunning way wagons were attached and detached from moving ropes when negotiating inclines. The one outstanding (from our viewpoint) piece of information they didn't record, however, is a description of the locomotives employed; there is no mention anywhere of their construction and design.[3] That this was an oversight seems unlikely given the level of detail included elsewhere. It seems more probable the engines used at Hetton were just not considered 'state-of-the-art' and therefore of little interest.

Statue of Timothy Hackworth at Shildon, County Durham.

If the Hetton railway was the penultimate 'finest in England', then the S&DR was the ultimate, to the extent that von Oeynhausen and von Dechen visited New Shildon twice, the first in the autumn of 1826 and the second just before their return home in the summer of 1827. A lot had happened at New Shildon in the previous twelve months. The two major inclines at Etherley and Brusselton, which brought in the output from all the neighbouring collieries, were fully operational and the first coal and passenger trains were plying between New Shildon and Stockton-on-Tees, albeit that steam locomotives were only being used on freight trains. In consequence the S&DR was internationally famous and there was a veritable stampede to build new public railways on the strength of its success. Given this situation, it is surprising that the visitors from abroad were given so much leeway to examine the minutiae of railway operation on the S&DR, particularly the costings, profits and losses involved, with the distinct possibility that they might broadcast what they found. Perhaps it was because the information was meant to go overseas that was the telling point: poor communication in the early part of the century would likely ensure that no useful material was going to find its way into the hands of the S&DR's competition, or if it did it would arrive too late to have any significant financial relevance.

The S&DR was in a state of transition. Although regular trains were now working between the central Durham coalfields and Teesside, the rail network was far from complete; at the end of 1826 only the main line was built, along with a major branch to the market town of Yarm and a few short spurs to local collieries. At New Shildon the company still had to purchase all the land it needed for sheds and workshops. Land acquisition had proved a long drawn-out process. From the local landowners' perspective the land the company needed had little agricultural value, as it consisted of un-farmable marsh; nevertheless, since its purchase obviously meant so much to the S&DR, hard bargains were being struck and discussions were dragging on. Some indication of the poor quality of the land is evident in the German report where the two engineers noted that the nearby incline at Etherley kept collapsing because "the swampy ground was not able to support the weight of the embankment, which continually sank and caused the ground to swell up at both sides".

Despite this, New Shildon was already the hub of S&DR operations and was now presided over by the recently appointed Timothy Hackworth, described in the Prussian report as the S&DR's 'mechanician'. Six locomotives were in use, four observed to be similar in construction and hence likely to be the Stephenson engines: *Locomotion*, *Hope*, *Black Diamond* and *Diligence.* The fifth was probably also a Stephenson engine, the ill-fated *Stockton* which spectacularly fell apart shortly after the German's visit, killing the driver. Intriguingly, the sixth may have been the experimental four-cylinder 0-2-2-0 known to the railway as 'Chittapratt', the name derived from the staccato chuffing noise exhausted steam made.[4] Although steam locomotives were viewed in the report as an improvement on horses in terms of their load-carrying capability, their performance was also recorded as less than impressive. The average speed for journeys between Shildon and Stockton involving sixteen loaded coal wagons was 4mph, rising to 5mph hauling empties on the return leg. What's more, the engines were constantly breaking down, a fact the authors diplomatically attributed to the poor state of the track, where mainly cast iron rails had been laid down.

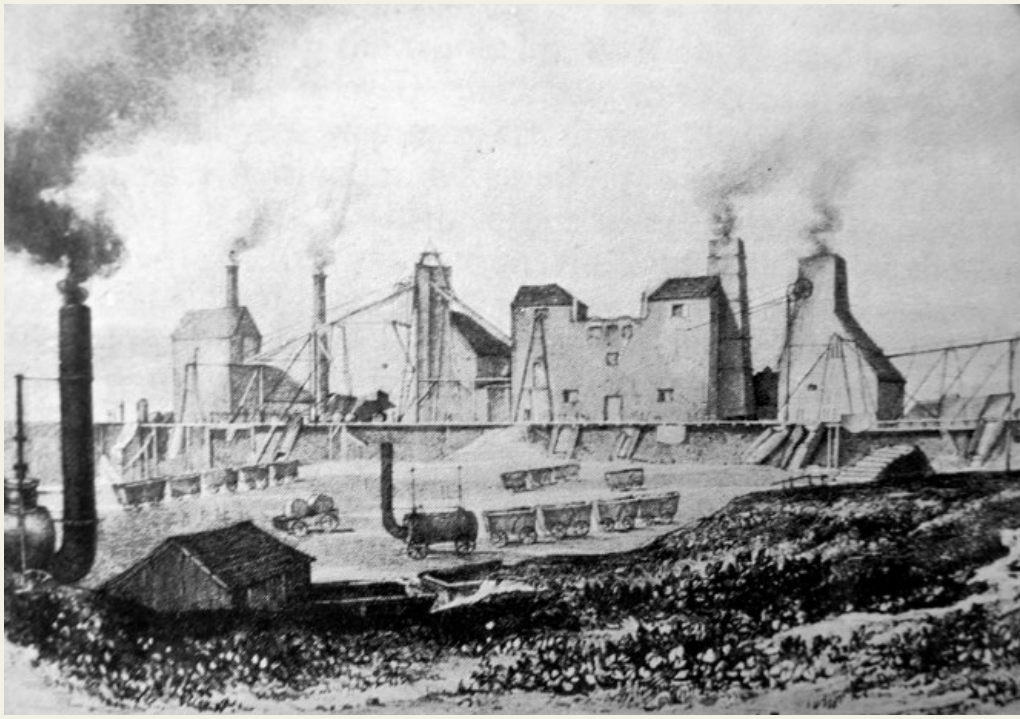
It was also pointed out, probably significantly, that the locomotive drivers were not directly employed by the S&DR but were sub-contractors, transporting goods at the rate of a farthing (one quarter of an old penny) per ton per mile. Out of this the drivers had to pay for all the coal and oil used as well as the wages of a fireman, without whom the engines couldn't be operated. Incidentally, the rate of

pay for horse drivers on the S&DR was much higher and without the extra expenditure incurred, although the freight tonnage they could shift during the working day was that much smaller. According to the authors the damage caused by locomotives to the rails, with the additional cost of purchasing and maintaining them, meant that their superiority over horses was marginal at best. As they put it: "On these grounds it may be difficult to ascertain exactly how much advantage, or whether any advantage at all, results for traction by locomotive engines."

The management board of the S&DR was no doubt thinking the same thing. In consequence, the forthcoming crucial intervention of Timothy Hackworth, by producing reliable and efficient engines, may have ensured the survival of the steam locomotive both here and throughout the world. Although the Teutonic duo was unconvinced of the benefits of steam, they agreed to travel to Robert Stephenson's Forth Street works at Newcastle to see what improvements were in the pipeline. What they saw there was a revolutionary 0-2-2 engine with two horizontal cylinders, partly enclosed within the boiler. This engine was subsequently supplied to the S&DR and given the name *Experiment*. However, as an experiment it was not a success. The engine only lasted a couple of years before Hackworth completely dismantled it and rebuilt it in the form of an 0-6-0 similar to *Royal George*.

If they were unimpressed by the locomotives they saw, the European visitors had nothing but praise for steam-driven inclines, to the point where you might have supposed their eventual recommendation to their employers would be for continuous-rope worked railways, as indeed existed on a few small private operations. There were, nevertheless, one or two glitches even with these which needed attention. In the days before telegraphy, communication between train drivers and the winch house at the top of the hill was a problem. The agreed procedure on the S&DR for wagons travelling over inclines was that they would be lined up at the foot of the hill and when the railwayman in charge thought them ready he switched a crude disc signal to the 'go' position.[5] Unfortunately this signal was too far away for the engine house operator to see. The solution, which appears to have impressed the Germans, was the provision of fixed telescopes located at engine house windows. What procedure was followed on foggy days is not stated.

After exhausting possibilities in the North East the duo moved on to the Liverpool & Manchester Railway (L&MR) by way of the Middleton Railway (MR) in Leeds, one of 23 privately owned and operated railways they inspected in their grand tour. The Middleton Railway lays claim to being the first profitable and reliable steam railway. Built in 1812 as a rack and pinion railway, the two pistons on each of their locomotives turned a cog connected to a rack which ran alongside the rails. Efficient in terms of negating wheelslip it didn't make for speed and the engine was seen by the Germans as unbalanced, since all the traction was directed on one side only. The only advantage the engineers could see to the lop-sided rack and pinion arrangement was that it left the gap between the rails free for horses to use, with once again the inference being that horses were a better haulage option. They were more impressed by the stone-built coal drops they were using and in particular the clever way the bottom of each wagon opened up to release coal as they travelled over the top of the storage bays.



Hetton Colliery from an early nineteenth century drawing.

With little novel to report the two men didn't hang around at Leeds, preferring to devote their precious time to the more promising developments at Liverpool and for once we know when they were actually on site; it was April 1827. Having seen what Stephenson had done at Hetton and Darlington they were eager to find out what the next stage in railway development would be. Unfortunately, as it transpired, there was little to see. The difficult and revolutionary construction of the railway over the morass that was Chat Moss still lay in the future and the Prussian delegates were left with inspecting the ongoing work on the rail tunnel being dug beneath Liverpool. Nevertheless they carried this out with typical thoroughness. Seven access shafts to the tunnel had been created at evenly spaced intervals and to one side of the tunnel workings, so the intrepid duo clambered down each of them to view at first-hand how work was being conducted.[6] Each section of the tunnel was being worked in isolation from its neighbour, with temporary rails laid down as the work progressed to enable spoil to be transferred easily to entrance shafts and lifted to the surface. It was noted that only the arched tunnel roof was made out of brick, the rest reliant on the strength and quality of the local red sandstone. Back on the surface, where rails had been laid, they were of a robuster (and more expensive) wrought iron than that used on the S&DR, with the suggestion made that this was because Stephenson's four-wheeled locomotives were still destroying rails in the North East, including those made from wrought iron.[7]

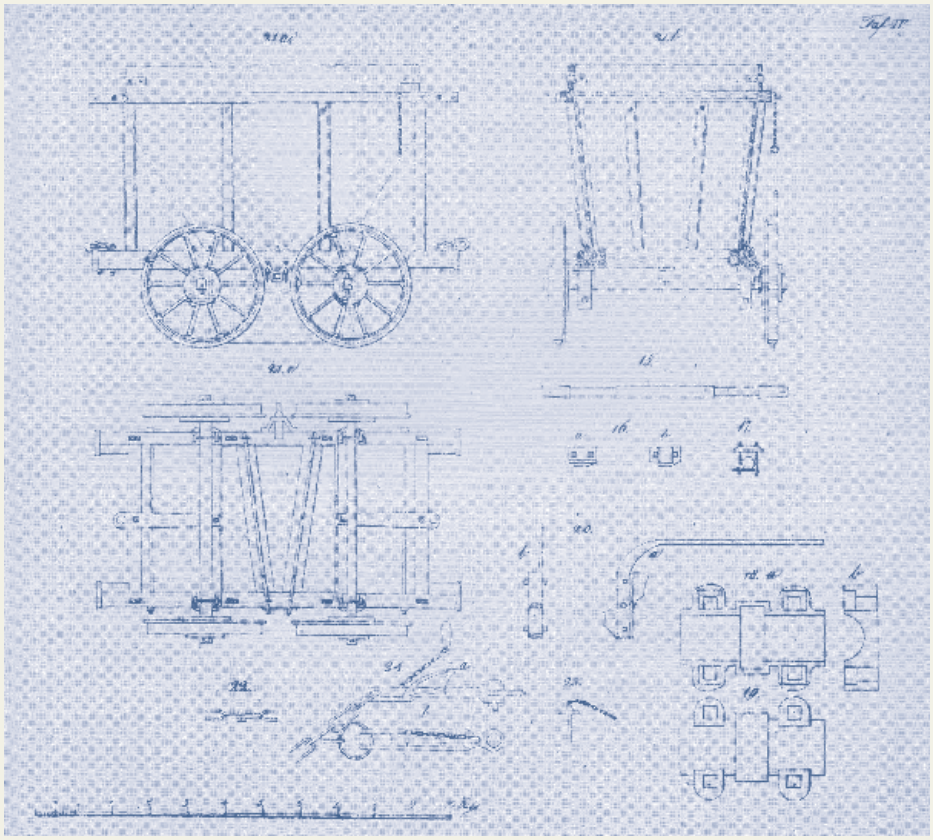
With nothing much to measure in Liverpool they travelled the short distance to Bolton to inspect the Bolton & Leigh Railway, the last public railway designed to be used by steam locomotives they visited. This was also in the process of construction, with the intention that it would eventually connect with the L&MR. The two foreign visitors were able to observe for the first time the cut-and-fill techniques being used for making cuttings and embankments and examine the elaborate tipper wagons used for moving spoil.

Having exhausted the potential of public railways the Germans set off down to the south west to look at tramways, many of which had been operating since the previous century.[8] They went first to Dartmoor to inspect the cast iron narrow gauge railway laid from the coast to a solitary building in the middle of the moors, the same building that became Dartmoor Prison. Originally built to house Napoleonic War prisoners, it had been standing empty for years pending an official decision as to future use. A recent proposal for converting it to an agricultural school for 'poor children', to instruct them in the arts of turning barren moorland to profitable farmland, had fallen through, much to the relief presumably of both the moorland and the 'poor children' concerned. We are thinking 'Dotheboys Hall' here. The railway was, nevertheless, being used. It had come into its own as a means of transporting local granite to Plymouth for export as building material and the visitors made elaborate notes on the arrangements being made to lift the stone into the holds of ships at Plymouth docks.

They travelled from tramway to tramway, more than a dozen in total, through Cornwall, Devon and South Wales, summarising in a few paragraphs, supplemented by the occasional drawing, what they found. By far the most interesting of these short accounts was their encounters with two strange monorails, both designed and built by Henry Palmer.[9] The first of these had been constructed to service merchant ships on the Thames at Deptford and was intended to facilitate the transfer of goods from ships to nearby warehouses.

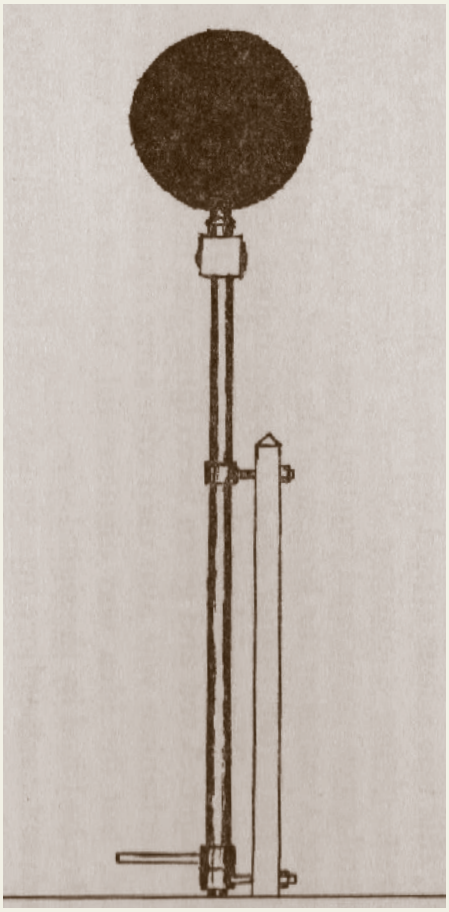
The monorail they saw was essentially a continuous metal bar, elevated three feet above the ground, which acted as the rail on which the unique wagons travelled. These were fitted with three 18in wheels, each lined up one behind the other. They had been cast with a double flange, which overlapped on both sides of the rail thereby preventing lateral movement. The wagons could weigh more than two tons when fully loaded but were 'easily moved' manually by four stevedores. A similar arrangement pertained at limekilns at Cheshunt in Hertfordshire, although in this instance most of the mile-long monorail was below ground level, supported on a timber framework located in a trench, complete with complex sidings and metal-gated level crossings where the tramway crossed roads. Unlike at Deptford, horses were being used to haul the two-wheeled wagons involved. Despite the novelty both 'Palmer' monorails are given short shrift in the Prussian report: "The Palmer railways do not appear to afford the necessary security, nor to permit the use of the forms of wagons often necessary."

Having completed their stint in the UK the two men returned to Germany where they would go on to enjoy distinguished careers: Karl von Oeynhausen became the Prussian Chief Mining Councillor and later Privy Councillor in the Finance Ministry, whilst Ernst von Dechen became Head of the Ministry of Mines, Factories and Salt Works and Member of the Prussian Council of State. Their railway report didn't get published until late in 1829, by which time steam railways in England were already demonstrating their worth in a way the two Germans would never have envisaged. In the summary they enthused over wrought iron rails which the authors recommended for use in all German mines. They demonstrated no similar support for steam locomotives. It is obvious the financial benefit arising from the use of steam locomotives over other forms of traction, in 1827, was marginal at best and steam locomotives looked a risky business. The conclusion they reached was understandable. Hindsight is a wonderful thing. It was only because of continual promotion by George Stephenson, and the improvement in performance achieved by Timothy Hackworth, that the move to steam didn't stall, both here and abroad. Judging by what Karl von Oeynhausen and Ernst von Dechen found during their extended visit, it was a close run thing.



Drawing of a coal wagon from the Prussian engineers' report.

Drawing of the disc signal used on the S&DR worked inclines.



References

1. Presumably these are the two shown on the famous drawing of the colliery. Only five locomotives are accounted for in the report.
2. Thirty years later there were no steam locomotives on the railway, horses being used in their place.
3. Since one of these engines (or perhaps an early replica) has survived and is resident at Beamish Industrial Museum, we do know what they looked like and how they operated but on this particular point the two 'vons' are silent.
4. It is known from other sources that 'Chittapratt' was such a poor performer it was eventually taken apart, with parts recycled in Hackworth's revolutionary 0-6-0 *Royal George*. It could not have been the Stephenson engine *Experiment* as suggested in Ahrons, which wasn't delivered until the following year.
5. According to Holmes this was just a white disc on a pole which was turned edge on to the incline until the wagons had been correctly coupled to the ropes when the pole would be rotated to face the engine house.
6. Since the descent involved a series of crude, hand-made wooden ladders, this was even more precarious than might be supposed.
7. Oeynhausen and Dechen refer to the S&DR as the "Wrought iron railway at Darlington". Nevertheless, although effort was being made in 1827 to replace cast iron rails with wrought iron most of the line was still laid using the former because of cost. This was a significant factor in Hackworth's move to six-wheelers which spread engine-load so much better.
8. Not completely true as they did visit the Surrey Iron Railway Company which ran from Wandsworth to Croydon and was the world's first public railway, albeit involving only horse-drawn trains. They weren't impressed; one of their few comments was "The line…has not completely achieved its objective and has anything but encouraged similar undertakings."
9. These monorails, designed by Henry Robinson Palmer, are believed to be the first in the world, Palmer had started his career as an engineer working for Thomas Telford before striking out on his own. Amongst his many achievements he is credited with the invention of corrugated iron.

Bibliography

Ahrons E. L. *The British Steam Locomotive 1825–1925* (The Locomotive Publishing Company limited: 1927).

Baxter B. *British Locomotive Catalogue 1825–1923 Volume 5A, North Eastern Railway* (Moorland Publishing Company: 1986).

Holmes P. J. *Stockton and Darlington Railway* (First Avenue Publishing Company: 1975?).

Mountford C. *The Private Railways of County Durham* (Industrial Railway Society: 2004).

Oeynhausen C. Von and Dechen H. Von, *Railways in England 1826 and 1827.* Translated from the German text by E. A. Forward (published for the Newcomen Society by W. Heffer & Sons: 1971).

Young R. *Timothy Hackworth and the Locomotive* (reprinted by The Book Guild Ltd: 2000).

Tomlinson W. W. *North Eastern Railway,* 3rd Edition (David and Charles: 1987).