

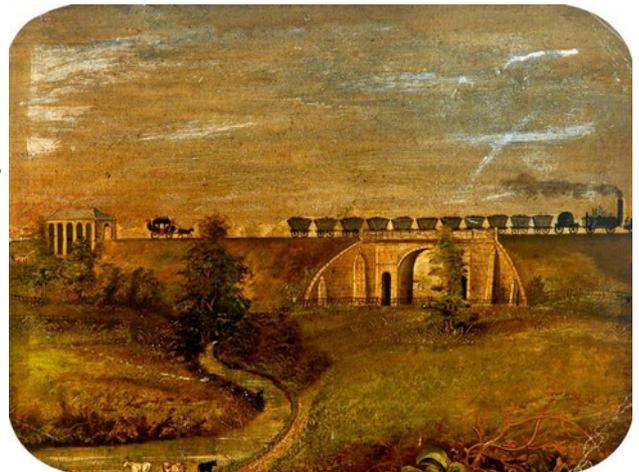
# A BRIEF HISTORY OF THE STOCKTON & DARLINGTON RAILWAY

## PART 3 -1825 TO 1833 THE TRANSITION YEARS (THE STRUGGLE FOR STEAM!)

### INTRODUCTION

In Part 1 of our history we left the founders of the Stockton and Darlington Railway Company (S&DR) and their Engineer, George Stephenson, in the highest of spirits having achieved the completion of the route and successful transport, of both goods and passengers, along its “iron road”; drawn by what was to become an iconic steam engine “Locomotion No 1”.

The period to follow, to the end of 1833, beset by wagon and locomotive related operational issues, was to severely test the companies commitment to steam as the motive power of their venture, as it struggled in its transformation from a hybrid horse drawn /steam powered system to a fully fledged locomotive system ; in doing so realising the dreams and aspirations of its founders . The fact that it did so was in no small part due to the engineering ingenuity and perseverance of another of the great railway engineers of the day Timothy Hackworth.



### THE ISSUE OF COMMON USE

In looking at the early operations of the S&DR we have to acknowledge the “rules of engagement” that applied to both a preceding and ongoing mode of transport, that of the canal system.

Although canal companies constructed and maintained individual navigations they were in essence “public ways,” to the extent anybody could make use of them to transport goods or passengers on the payment of a toll. By the end of the 18th century this modus operandi had largely spread to the coal wagonways of the North-East of England, throwing open access to any interested colliery owner.

It was this issue of “**common use**” that the S&DR inherited and adopted from the beginning. At the time of the opening in 1825 the working of the line bore striking resemblance to established canal practice, insofar as in practice it allowed public right of way. On the payment of toll individual colliery owners were able to lead their own coal, a custom that soon extended to general merchandise

There was nothing in the first S&DR Act to prevent entrepreneurs contracting directly with colliery owners to provide wagons, thus relieving them of considerable capital outlay. Correspondingly to maximise revenue the company had to fashion a response, which in theory was to increase its own wagon fleet to provide a full service. The company also needed to distinguish between company and private wagons, so they could levy the appropriate tonnage rates .It was a provision of the 1821 Act that owners of other wagons and carriages clearly identify them by appropriate marking.

The companies attitude towards passenger transport was initially driven by limited revenue expectations, whilst they were willing and able to provide a service, it was not the “raison d’etre” for the lines existence which in revenue terms had to driven by coal and other haulage.

The realisation, or otherwise, of the companies declared ambitions, as restrained by the provisions of the Railway Acts, was in reality far from straight forward with many operational challenges and with resultant revenue impacts . This fascinating story is outlined below:

## GOODS WAGONS

Whilst high provision of a large fleet of company rolling stock was desirable, both in terms of revenue income and operational control, the reality at the outset was heavily constrained by the initial company possession of only 150 chaldron wagons.

These wagons were designed for wagonway use, and as such were unsuitable for use at Stockton staithes, that is they were 13cwt under capacity at 40cwt (London chaldron) as opposed to the required 53cwt (Newcastle chaldron) and could not be directly discharged into ships holds, due to their end board configuration.

This initial situation with the wagon fleet led Thomas Storey, the assistant resident engineer, to declare in October 1825 that **“they were as bad a set of wagons that ever turned out on a railway”**

In response a short term solution was achieved by a series of modifications ;adding side boards to increase capacity to 53cwt and adapting discharge to a bottom board arrangement.

This temporary fix did not deal with other unsuitable features of the chaldron wagons i.e they suffered from constant wheel breakages due to fixed axles and they were far from ideal for general merchandise. In addition there were difficulties on falling gradients where the wagon had a tendency to overtake the horse, with often serious implications.

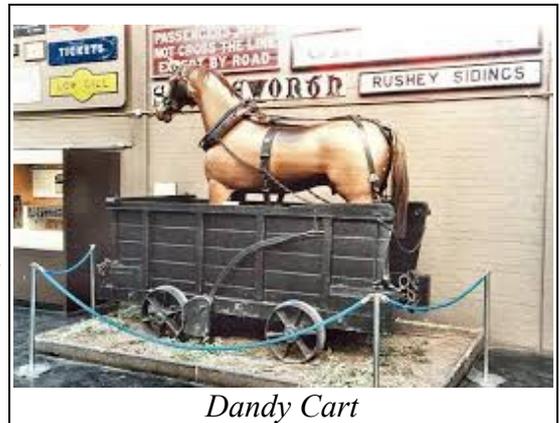
As is nearly always the case in our story engineering ingenuity provided a solution. After a brief trial of “Thomas Brandreth” designed wagons Robert Stephenson and Co introduced a new spring mounted wagon with anti friction rollers .Introduced in November 1828 this new generation of improved wagons, capable of carrying up to 4 tons became the prototype for the **“standard British goods wagon”**.

The issue of the chaldrons overtaking horses was resolved in summer 1828 with the introduction of the “dandy cart”; a special low carriage attached to the rear of the chaldrons, equipped with a supply of hay and water, in which the horse was able to ride on the downhill sections. The mileage thus travelled, on the run to Stockton, was in excess of 13 miles.

It is said the horses very quickly got used to this method of working and enabled the company to extend horse performance from typically 140 miles to 240 miles per week. Although dandy carts were employed only briefly on the main line they persisted elsewhere on the system to the mid 1850's.



*Chaldron Cart*



*Dandy Cart*

## LOCOMOTIVES

### FAULTS AND FAILURE

For some time after the opening the only engine available to the S&DR was Locomotion No1, until the late arrival of No 2 Hope in November 1825 ;with the two sister engines No 3 Black Diamond and No 4 Diligence being delivered in April/May 1826.

In terms of mechanical reliability of the first four engines it is in no way unkind to say they were far from perfect There was a whole series of mechanical deficiencies that put Locomotion and her sister engines out for months.

For the S&DR management committee the initial exuberance attached to the first steam locomotive to run a passenger carrying service soon turned to frustration and accusation, largely against Robert

Stephenson and Co,as to the”experimental” nature of the engines on both the locomotives and in- static form at the Brusselton and Etherly engine houses.

Not only were the engines prone to mechanical failure,and numerous wheel breakages when driven over 8mph,they were notoriously difficult to drive. In March 1828 Hope's boiler blew up killing the driver John Gillespie,**the world's first recorded fatality on a railway in operation**,whilst taking on water at Aycliffe Lane .On 1<sup>st</sup> July 1828 Locomotion's flue burst killing the driver John Cree and maiming the water pumper Edward Turnbull.

Operational difficulties were exacerbated by the fact that in common with her sister engines neither Locomotion ,nor her tender,were fitted with brakes;the only way to stop was to reverse the engine, a complicated man intensive manoeuvre at 12miles per hour and more.

**In reality one could only admire the men who rode this”first generation of spider legged patriarchs”**

The inevitable consequence of these mechanical breakdowns was that for long periods the company was obliged to resort to horsepower as the sole means of hauling its heavy trains of chauldron on the main-line. **In fact so unreliable were these first generation locomotives the company gave serious consideration to abandoning steam power permanently in favour of horses and gravity.**

Even if the locomotive engines had been reliable they would in reality have had difficulty in handling all the freight traffic generated; in the year ending 30<sup>th</sup> June 1827 this totalled some 100.000 tons, well ahead off forecast, to some extent the S&DR was falling victim of its own success!

Even when the steam locomotives were repaired and in working order they handicapped in their operational performance as they were obliged to share a track cluttered with horse drawn transport i.e. chauldrons and passenger coaches, playing havoc with scheduling. This amongst other factors including unreliable locomotive performance and the impact of the “common use” policy meant in reality horse power had the ascendancy over steam power until the 1830's.

## LOCOMOTIVE IMPROVEMENTS

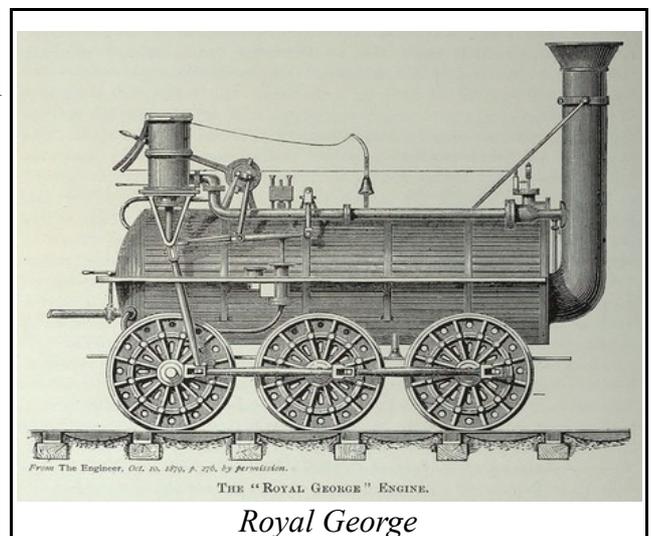
Matters surrounding operational performance came to a head in 1827, despite the unreliability of the four engines of the “0-4-0 Locomotion Class” in operation, they were still calculated by the companies chief engineer Thomas Storey to be 30% cheaper in use then horses. As a consequence it was obvious the companies chief priority was not only to secure more locomotives but more efficient and dependable ones.

In this respect there is some debate as to whether the first of these improved engines was No 5 Royal George, designed and built by Timothy Hackworth at New Shildon, or No 6 Experiment by George Stephenson, and built by Robert Stephenson and Co at Forth Street Newcastle.

The 0-4-0 class Experiment, which first saw work on the S&DR in January 1828, witnessed a cylinder redesign from vertical to horizontal and a complicated system of levers and connecting rods transferring thrust from the pistons to the load bearing wheels.

It was however Timothy Hackworth, as resident engineer on the S&DR, who was the major player in restoring trust in the steam engines reliability and ultimately prestige in the motive form.

The result the “Royal George” was the first truly successful locomotive on the S&DR and was the template for a class of six coupled goods engines which were to prove the mainstay of the railway for



decades to come. Not for the first time, nor the last, had Timothy Hackworth's ingenuity and invention saved the day for the S&DR.

Royal George itself was technically a great advance on previous designs, many of the spidery rods and levers had gone and at 15 tons it weighed almost twice as much as Locomotion No 1's 8 tons, and the weight was spread over 6 wheels. The driving axle was rigid with the boiler, the other two axles were sprung and the wheels were coupled by external rods. The exhaust was turned up the chimney to form the blast pipe which induced air through making it burn brightly .

The use of a return flue in the boiler gave twice the area for heat to be transferred from the fire to the water. It also meant the driver could be at one end of the locomotive and the fireman at the other. Another Hackworth speciality was a coal and water wagon, known as a tender, which could be attached at either end of the locomotive.

Hackworth's spring loaded safety valve ensured that the boiler pressure, still about 50lb per sq in, did not exceed the safety limit. This safety valve arrangement stopped excessive pressure build up which could result in the boiler exploding with fatal consequences.

The Royal George began working in November 1827 and over the next few years was influential in ensuring that the lion's share of coal traffic east of Brusselton incline was hauled by locomotive power, critical to ensuring the companies ongoing commercial success.

### TIMOTHY HACKWORTH

A devout Wesleyan Methodist whose name was to become synonymous with the early railways and Shildon, Hackworth was borne in 1786 in the same Northumberland village of Wylam as George Stephenson. Educated at the village school before serving a seven year apprenticeship as a blacksmith, until the age of 21, from the start a man with a natural aptitude for mechanical construction and research. He worked as foreman smith at Walbottle colliery until 1824, becoming acquainted with George Stephenson in 1823, and in fact working as temporary manager at the Forth Street works for 9 months. Stephenson was impressed with both his efficient manner and immense practical abilities.

On Stephenson's recommendation he followed him to the S&DR, in 1825, initially as superintendent of the permanent and locomotive engines, arriving at New Shildon where he was to remain until his death in 1850.

During those early years much of Hackworth's time and considerable ingenuity was absorbed in keeping Stephenson's locomotives serviceable, utilising basic tools enhanced by those he designed himself.

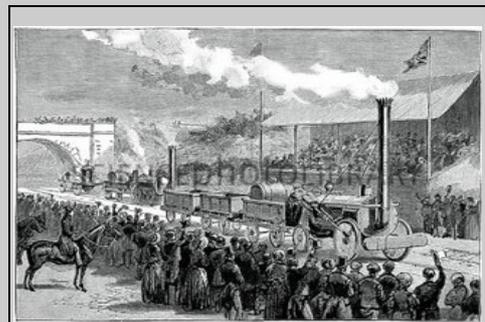
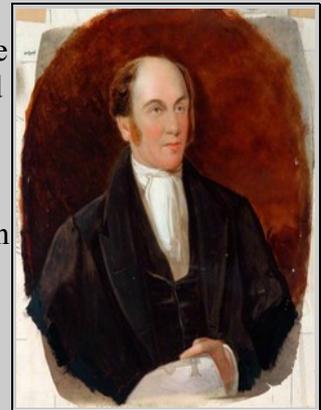
In 1827 he designed and built the Royal George, which in essence saved the day for locomotive traction on the S&DR, and went on to design and build the Sans Pareil, a worthy second in performance to the Rocket at the Rainhill trials.

Throughout his career he continued to provide practical solutions to many of the unprecedented problems posed by the early railways and in 1840 left the S&DR to set up as a general engineer and locomotive builder, establishing the then "state of the art" Soho Engine works at New Shildon.

Going on to build model houses for his employees and his own home Soho House, now part of the National Railway museum at Shildon.

Driven by his Methodist beliefs Hackworth exhibited an overriding concern for both the spiritual and social welfare of his workforce, building the world's first railway institute.

Very much Shildon's adopted son street's, institutes and public houses bear his name and a depiction of the Royal George is very much the town's emblem .Hackworth died on the 7<sup>th</sup> July 1850 and lies in the churchyard of St John's church ,in Shildon.



*The Rainhill Trials*

## PASSENGER SERVICE

As previously mentioned the companies attitude to providing a passenger service was initially driven by limited revenue expectations, with a need to concentrate on coal and other product haulage.

The demand for such a service ,which ultimately exceeded initial expectations by a wide margin,led to an evolving company policy and approach, but with provision of an essentially all horse drawn service until 1833.

This continuing monopoly of horsepower, in the early years, was further influenced by the initial view of the company itself, that steam power could only be economically viable hauling passenger coaches if coupled to freight trains of chaldron wagons, which rightly or wrongly was against passenger preference on perceived safety grounds.

From our earlier narrative this passenger preference was rendered irrelevant by on going locomotive performance issues, which in reality negated the possibility of steam haulage.

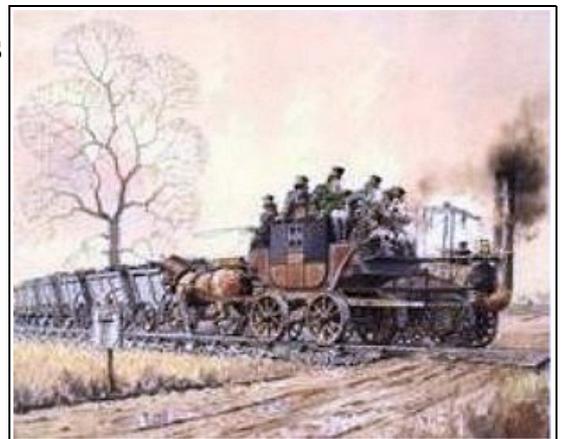
A brief history of passenger transport, on the S&DR from 1825 to 1833 is outlined below,which in reality fell into a number of stages of operation, resulting in a fortyfold increase in revenue from a mere £230 in the first year of operation to some £9700 by the end of the 1830's.

From initially adopting a position of direct control,utilising the companies's coach Experiment, S&DR quickly accepted an offer to have the coach run for them by an independent contractor,Thomas Close, whose unreliability soon led to his replacement by an alternative contractor, Richard Pickersgill .This service proved so popular a second more comfortable coach “Express”was brought into operation by S&DR.

The agreement with Richard Pickersgill was cancelled in May 1826 in favour of a “free for all “ arrangement, involving a number of private entrepreneurs, including most famously Daniel Adamson the landlord of the Grey Horse Inn in Shildon. In 1827 Adamson,who was also a local coal leader, pioneered a passenger service with his adapted railway coach Perseverance between Shildon and Darlington from the Mason's Arms. This route was extended in 1831 with the opening of the Surtees Railway branch,resulting in the positioning of a coach house at the corner of Byerley Road and Main Street .This coach house still stands in Shildon to this day.

Resulting from this opening up to free enterprise we witness passenger service whose disorderly running is of increasing concern to the company . With difficulties often encountered with coaches meeting

each other “head on”or failing to give precedence to allow a steam train uninterrupted passage .**Whilst a protocol existed, and passing loops were installed, mayhem often prevailed!**



As a consequence of the disorganised nature of operations the company took steps in January 1830 to impose a rigid timetable arrangement on all coach operators, which went some way to improve matters over the next three years before we finally witness unification of passenger and haulage operations under direct S&DR control, with the exclusive use of steam as the motive power on the main line.

### **STEAM WINS THE DAY**

Subsequent to the introduction of the Royal George and Experiment into service, in 1827/8, we witness Timothy Hackworth turning his hand to the issue of steam drawn passenger traffic resulting in the design of No 9 The Globe, manufactured by Robert Stephenson and Co in 1830 featuring an internal cylinder design and cranked axle and re-portedly capable of speeds up to 50mph, under favourable circumstances. Whilst dual purpose its primary function was for passenger transport, it was the forerunner to a period of intensive locomotive building in the early 1830's, culminating in S&DR possessing some 19 locomotives by 1832 heralding at last the substitution of steam power for horsepower on the main-line.

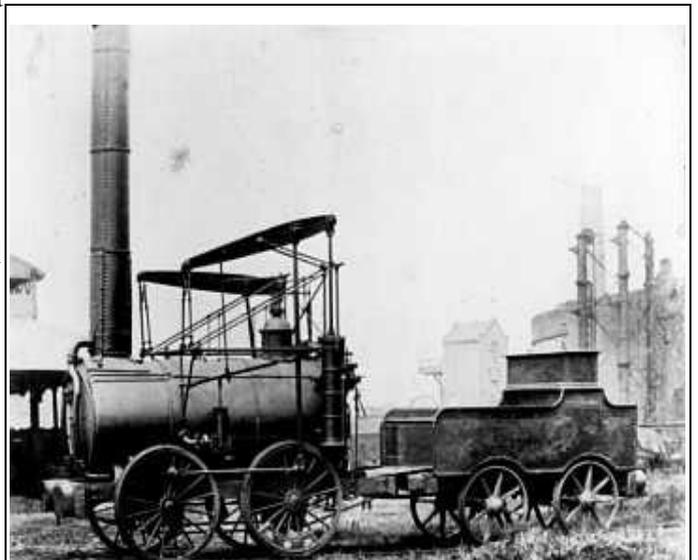
In April 1833 John Graham, as traffic superintendent, was able to report that on the main line that all coal traffic was now locomotive led. In the August of that year it was decided to extend this take-over to passenger traffic. In September 1833 S&DR bought out the franchises of the independent coach operators for a total sum of £316, **a fully steam hauled passenger service had finally arrived, some 8 years on.**

#### **footnote:**

The achievement in 1833 of a fully steam traction system was in reality some 3 years later than the LMR, where Stephenson's engines had been successfully and regularly hauling both passenger and freight trains since 1830, following the success of Robert Stephenson's Rocket at the Rainhill Trials, in October 1829.

The Rainhill Trials themselves were to prove another defining moment in railway history when a crowd estimated between ten and five teen thousand people gathered at the tiny hamlet of Rainhill, some 10 miles from Liverpool, to witness one of the most remarkable events of the industrial age. A competition between railway locomotives to see if any of them possessed the vital combination of speed, power and reliability in sufficient measure to run the first inter-city rail route.

As to that first generation of spider legged locomotive engines some continued to work on until the 1860's. The last of the old design the "Agenoria" was built by Foster Rastrick & Co of Stourbridge, in 1829, and after a long working life was presented to the Science Museum in 1824, and now resides at NRM York.



*The Agenoria*

Locomotion No1 itself continued to serve the S&DR until 1841 and ended its working life at Messrs Pease & Partners West Collieries South Durham as a static pumping engine.

In 1857 it was put on display at Darlington's North Road station, widely exhibited and it took part in the centenary celebrations of 1925; it's now based at the Darlington Railway Museum

#### **PART 4**

In Part 4 of our history we will examine the expansion of the network from the 25 mile main line, opened in September 1825, to include other branches as authorised under the first three S&DR Acts. We will also take in the extension to Middlesbrough Dock and the formation of the town of Middlesbrough itself, from its modest beginnings as a tiny coastal hamlet; along with the coastal extensions to Redcar and Saltburn.

Finally we will briefly look at S&DR's association with the formation of an extensive new line network, by often nominally independent companies but with close operational and financial links

**In all the establishment of a minor railway empire !**