V.—THE WAGONWAYS OF TYNESIDE.

By Charles E. Lee.

When the mining wagonway, in its improved form as used extensively in the eighteenth century in the Northumberland and Durham coalfields, was introduced into the Ruhr district at the end of that century, it was referred to as an *englischer Kohlenweg*.[1] A Sheffield writer (and the inventor of the rival system of plateways) was even more specific in 1797 in describing the wagonway accommodating large flange-wheeled vehicles as the "Newcastle waggon road".[2] These early horse-operated wagonways, or railways, were not a Tyneside invention—indeed, the principle had been known and used in the early civilizations of the Middle East[3]—but there can be little doubt that during the seventeenth century they were developed on Tyneside more extensively than elsewhere, and in a way which gave us the essentials of the modern public railway. Throughout the century their use appears to have been confined to the mining industry, and our surviving records are concerned almost entirely with coal mining in the Northumberland and Durham coalfields. Our first definite reference to rail transport in Great Britain is found in manuscripts[4] preserved by Lord Middleton at Wollaton Hall (near Nottingham), which indicate the existence of a railway in October, 1597, probably built by Hunt-

[1] *Geschichte des Eisen*, by Beck.

[2] *The Coal Viewer and Engine Builder's Practical Companion*, by John Curr of Sheffield, 1797, p. 13. See also *Archæology of the Coal Trade*, by T. J. Taylor.

[3] *The Evolution of Railways*, by Charles E. Lee, second edition, 1943; also *The Highways of Antiquity*, by the same author, 1947.

[4] *Report of the Historical Manuscripts Commission*, edited by W. H. Stevenson, 1911.

ingdon Beaumont. This same Beaumont was one of a syndicate of five which took over on September 9, 1605, the remainder of a Crown lease of mines in the coalfields of Cowpen and Bebside, near Bedlington. During the next few years they spent[5] upwards of £6,000 on equipment. Nevertheless, the venture did not succeed, and about 1614 the lessees abandoned the works. Among the plant and material they left on the ground was a railway, 500 yd. long, running between the coal pits and the salt pans, near the sea, at the mouth of the river Blyth, a railway which was built during their term of occupation. The records of the Crown Mines Office show that one of the original lessees (Peter Delaval) entered the works, after the retirement of Beaumont and his partners, and carried off "all the said rayles set upon the land and ground of Bebside for 500 paces in the wagonway on both sides of the way". It has not proved possible, so far, to ascertain definitely when the first railway or wagonway in Northumberland was built, but there are strong reasons for supposing it to be this line near Blyth. If it was used for shipment coal, the date would appear to be 1609, which was the first year in which the records of the port of Blyth show any considerable quantity of coal shipped from the river. The present writer inclines to the view that the wagonway was actually built in 1606, and first used to give easy access from the pits to the salt pans. William Gray's much quoted statements[6] of 1649 shows that the use of railways spread, but it would seem probable that the main development began after the Restoration. Nevertheless, we have a hint that the potentialities of wagonways came to be appreciated even earlier in some quarters, for an important project for making the King "the sole merchant of the Coales" was presented to Charles I on July 10, 1628. (See *Stowe MSS.* 326, No. 1.) The scheme proposed, *inter alia*:

> "(1) By makinge compitent passages for the waters, that annoye the mynors, or pyonors by makinge one Portable Ryver,

[5] *Chancery Proceedings*, James I.B. 17/61.
[6] *Chorographia*, by William Gray, published at Newcastle upon Tyne in 1649.

from those parts, where the Coales are to be acquired; by makinge Highwaies passable, and reformed Cariages, to convey the Coales to that Ryver. . . ."

The proposal was for the Crown to take possession of all the coal mines within the Bishopric of Durham "Uppon remoove of that Bishop" and to develop these mines as a royal enterprise. The "reformed cariages" were probably of the type designed to run on railed wagonways, as the present writer has endeavoured to show in *The Evolution of Railways*. It is scarcely necessary to say that this early suggestion of nationalization was not proceeded with.

As mines adjacent to the river (naturally the earliest to be worked) became exhausted, coalowners found it necessary to sink shafts farther inland; in 1689, it was stated[7] that "the coal-pits nearest the water are almost quite exhausted and decayed". Railways thus became a necessity rather than merely a convenience, and coalowners were compelled to make the best arrangements they could with intervening landlords for rights of passage between the pits and the staiths. Towards the end of the seventeenth century, complaints of excessive wayleaves were voiced frequently,[8] and in 1697 it was even suggested that Parliament should regulate the wayleaves, as unrestricted charges were imperilling the inland movement from the Tyne.

To the industrial historian there is a keen sense of satisfaction in describing the oldest surviving example in his particular sphere of interest, therefore it is proposed to devote detailed attention, in a paper dealing with railway track, first to the line which can claim this honour. There is little doubt that the oldest survivor is the section of the Tanfield branch between Norwood and Fugar Bank in County Durham, which has been in continuous use, and for the same kind of

[7] *Reasons offered to Parliament for the not laying of any further imposition upon coals imported to London*, 1689.

[8] See the *Records of the Newcastle Hostmen's Company* regarding a petition dated February 20, 1696, that Parliament should regulate wayleaves. This was what we now regard as 1697, as the legal and civil year in England began on March 25, until the passage of the Act of 1751.

traffic, at least since 1671. It may have been the first railway in County Durham, although there is no certain evidence of this.

Coal appears to have been wrought in the Team and Ravensworth district for several centuries, and a grant of wayleave from a colliery at Ravensworth occurs as early as the time of Bishop Ruthall in 1530.[9] A century and a half ago it was common tradition on the North-East coast that the first wagonways, and the second steam-engine used in the North, belonged to the Liddells, and, although this famous family was certainly anticipated by Huntingdon Beaumont with his 500-yd. wagonway at Bebside, the tradition is probably correct to the extent that the Liddells built the first wagonway leading to the river Tyne, and the first in County Durham. If this is so, the wayleave arrangement of 1530 was possibly used for this wagonway. The Ravensworth estate had been purchased by Thomas Liddell (from Sir William Gascoigne) in 1608, and as early as 1650 there are numerous references in the Whickham *Register of Burials* to wagonways in the neighbourhood of Whickham and Winlaton. Fordyce (p. 16) stated that the first railways with wooden rails and sleepers were introduced in the North of England between 1632 and 1649, though they were not in general use until 1670 or 1680. As he accepted the traditional Ravensworth priority, he would appear to assign the date of 1632 to its wagonway, which is not inconsistent with other evidence, but is not known to the present writer to have any documentary support.

The disturbed period in England during the contest between King and Parliament, which culminated in the execution of Charles I on January 30, 1649, was not an era of industrial development; nor were the uncertainties of the Protectorate likely to induce private expenditure on capital works. The first Liddell baronet was an active supporter of Charles I, and was made a baronet in 1642 for his defence of Newcastle. Sir Thomas Liddell was one of several "malig-

[9] *Coal and Iron*, by W. Fordyce, 1860.

nant coalowners" who, on the capture of Newcastle by the Parliament forces in 1644, were "wholly excluded from intermeddling with any share or part of collieries, or interest in any coals wharsomever that formerly they had laid claims to".[10] His lands and rights appear to have been restored to him in 1650.[11] With the restoration of the monarchy on March 29, 1660, the era of continuous railway development begins, and it is probable that the Ravensworth wagonway—the first section of the Tanfield line—was rebuilt or restored at this time. The will of Sir Thomas Liddell, August 1, 1661, shows that coal was then being worked at Ravensworth, as he refers to the grant of one coal pit there to his son, Sir Francis Liddell, on the occasion of his marriage.

We have a distinct allusion to railways at the northern collieries in a document[12] of 1660, regarding "a bargain and sale from Sir Richard Tempest and others to William Carr and others of ten keels or lighters, and a quarter part of the wood or timber laid upon trenches, bridges, and wagon-ways or unlaid upon the same". Other evidence of the existence of wagonways about this time in the Stella and Ryton district appears to be afforded by the information obtained in connection with a law-suit of 1665 concerning Crawcrook colliery. The wagons used here are stated to have carried fifteen bowles (bolls) each, equal to about 33½ cwt., or two wain-loads, a size of vehicle which it would seem must have run on a wagonway.

The Ravensworth Wagonway was certainly at work in 1671, for staith files preserved at Ravensworth Castle were quoted in 1810[13] by —— Robson, then Agent at Ravensworth, as evidence of the date of "the earliest mention of coals delivered by waggons . . . at Team-Staith". From the lawsuit of 1665 it appears that coal was then being worked at Marley Hill, to which point the wagonway was probably extended about that time. In 1693 the Bishop of

[10] Bourne's *Newcastle*, p. 234.
[11] *Cal. State Papers*, Dom., 1650, p. 613.
[12] Cited by T. J. Taylor, *Proc. Arch. Inst., Newcastle*, 1852, vol. I, p. 180.
[13] Bailey's *General View of the County of Durham.*

Durham let Blackburn Fell to Sir John Clavering and Thomas Liddell. Examination of the surviving historical records leads the writer to the opinion that the Ravensworth Wagonway was built probably in 1632, restored about 1660, and extended to Marley Hill between 1660 and 1665.

There is no known description of the precise form of this particular line in the seventeenth century, so we must turn to collateral evidence. A counsel's opinion of 1763 is the next document to assist us. It is an opinion upon a conveyance dated 1672 relating to the South Gosforth and Coxlodge collieries, and says, *inter alia*, "some short time before this conveyance a new method was invented for carrying coals to the river in large machines called waggons made to run on frames of timber fixed in the ground for that purpose and since called a waggon-way which frames must be of necessity lye very near, if not altogether upon a level from the colliery to the river and therefore wherever there are any hills or vales between the colliery and the river and the same cannot be avoided, it is necessary in order to the laying such waggon ways, then to make cutts through the hills or level the same, and to raise or fill up the vales so that such wagon ways may lye upon a level as near as possible". By this time, therefore, the construction of wagonways in the neighbourhood of the Tyne was treated as an engineering work of some magnitude. There is no suggestion here of the theory which has often been advanced that wagonways were evolved by a process of filling with logs the ruts in badly-made roads. Moreover, such ways are described as a new method invented some short time before, which is scarcely the phrase a legal man would apply to the rough and ready expedient of repairing deeply-rutted roads with baulks of timber. The one objection to this counsel's opinion as evidence is that, although the conveyance in question was made in 1672, the opinion was given 90 years later. I have been able so far to trace only a photographic copy of part of this counsel's opinion, and not the original.

We have, however, very valuable evidence of the position

in 1676 in Roger North's account[14] of his brother's experiences when he went on circuit to Newcastle. According to that writer: "Some of the aldermen related strange stories of their coal works. One related to wayleaves: When men have pieces of ground between the colliery and the river they sell leave to lead coals over their ground and so dear that the owner of a rood of ground will expect £20 per annum for this leave. The manner of the carriage is by laying rails of timber from the colliery down to the river, exactly streight and parallel; and bulky carts are made with four rowlets fitting these rails; whereby the carriage is so easy that one horse will draw down four or five chaldron of coals, and it is an immense benefit to the coal merchants."

Here is the clearest evidence of special vehicles for use on the rails, and, moreover, a statement of the peculiar feature of their construction, namely, that they were equipped with rollers fitting the rails. The probabilities are in favour of a wide wooden wheel running on the rail, with a narrow wheel of larger diameter fixed inside to act as a flange.

Despite wayleave difficulties, there was a considerable movement inland about the beginning of the eighteenth century, and many railways or wagonways were built. Some of the longest running to staiths on the Tyne were made for the purpose of serving the Tanfield and Pontop districts, and coal shipments from this area constituted a governing factor in railway construction for 150 years, and was productive of much competition when the era of public railways began. It would seem that the first wagonway from the Pontop area was a lengthy line to staiths at Derwenthaugh, *via* Dipton, Burnopfield, Bryan's Leap, Rowland's Gill, Winlaton Mill, and Axwell Park. This appears to have been built by Lord Windsor, Lord Dunkerron, Matthew Ridley, and John Simpson, who were working the coal demised by Anthony Meaburne previous to 1729[15] to Lady Clavering, Richard Ridley,

[14] *Life of the Right Honourable Francis North, Baron of Guilford, Lord Keeper of the Great Seal under King Charles II and King James II*, London, 1742.

[15] See *Spearman's Inquiry*, 1729, p. 85.

and others. The works between Bryan's Leap and Rowland's Gill were very heavy and costly, and at the latter point the line crossed the river Derwent by the Road bridge. Hutchinson in 1794[16] said that the "Darwenthaugh waggonway, extending from Burnopfield and Bryan's Leap to the River Derwent, was the most difficult and expensive work of the kind hitherto executed in the coal trade".

It seems that this came to be called the Main Way, and had other smaller lines connected with it. The date of its construction has eluded the many writers on the history of Durham and the coal trade, with the result that various guesses have ranged from 1650 to 1763. The most probable period is the first decade of the eighteenth century. Part, at any rate, of the line was then working, for a man named George Potts of Bates House was killed in 1710[17] by the upsetting of a wagon on this line in the neighbourhood of Winlaton Mill. In 1724 the coal staithes at Derwenthaugh are stated to have belonged to the following coalowners: Sir James Clavering, George Pitt, Mr. Blackston, and Mr. Shafto. (? Robert Shaftoe of Benwell.) The following account[17] gives some indication of the cost of railway material:

PER MAIN WAY

Received George Bowes, Esq.

	£	s.	d.
4917 Sleepers at 8d.	163	18	0
4282 Yards of Rails at 6d.	107	1	0
Totus	270	19	0

May 2nd, 1723.

During the eighteenth century there seem to have been many branches built to this Main Way, and also some realignment, and it is not now possible to trace all the details.

[16] William Hutchinson's *History and Antiquities of the County Palatine of Durham*, vol. III, 1794, p. 498.

[17] *History of the Parish of Ryton*, by William Bourn, 1896, pp. 183-4.

For the course of these lines we are dependent upon early maps and surviving traces, and it often proves difficult to reconcile these, especially as the maps are not to scale, and the positions of such landmarks as roads have changed in the intervening two centuries. The opening of one such branch seems to be indicated by the statement of Sykes in his *Local Records* that, on June 14, 1768, the coals from the new-won colliery at Tanfield Moor, belonging to the Rt. Hon. the Earl of Kerry, were conveyed down to the staith at Derwenthaugh. The greatest maze of lines was in the Pontop area, and the most detailed description of their routes is that given by the Rev. J. W. Fawcett in his *History of the Parish of Dipton* (1911), although some of his compass points appear to be stated wrongly.

One early wagonway of importance was that laid in 1712 over Tanfield Moor by Sir John Clavering and Thomas Brumell from their Lintz and Buck's Nook collieries. Two years later George Pitt of Strathfieldsaye used this line when he opened out the Tanfield coalfield. Tomlinson records[18] that Pitt, having laid other wagonways of his own, came into conflict with William Davison of Beamish, the lord of the manor, who demanded a wayleave rent on the ground that the liberty of passage enjoyed by Pitt was confined to carts and wains and did not include wagons running on rails. As Pitt was a member of Parliament the matter was allowed to remain in abeyance, but in 1719 Dame Jane Clavering, widow of Sir John Clavering, who had died in 1714, purchased for £4,000 Davison's rights in Tanfield Moor with the object of securing control of the wayleaves, and the matter was again raised. It was referred in 1721 to the Court of Chancery, and ultimately decided[19] in favour of Lady Clavering.

This did not end the matter, however, for Pitt seems to have taken counter action to impede Lady Clavering. The

[18] *The North Eastern Railway: its Rise and Development*, by William Weaver Tomlinson.

[19] Pitt *v.* Clavering, *Chancery Proceedings*, May, 1721.

following passage occurs in *Barnadiston's Reports*, vol I, p. 318: "Pit and Lady Claverinth (i.e. Clavering) *2* Geo. II (1729): One Wray was siezed of a Manor in the North, in which there was a great Waste called Tanfield-Moor, and sold it about thirty years ago, reserving to himself and his Heirs a convenient Way-leave, such as he and his Heirs should think proper, for the carriage of Coals thro' this Waste, from certain Coal-Works of his to the River Tyne. There was an Invention found out about Twenty years before (i.e. 1679) which was used pretty much in the North at the time this Manor was sold, of making Waggon-ways for the more easy Carriage of Coals which was done by levelling Ground from one Place to another, and then laying Planks into it, for making a more easy and short Conveyance of it. The Defendant was Lessee of some Coal-Works under the heirs of Wray, and by virtue of the Power in the Reservation she made a Waggon-way for her Coals, upon which the Plaintiff preferred his Bill against her." Eventually a *modus vivendi* seems to have been reached between the parties, for, by an indenture of demise, dated April 26, 1731, between Dame Jane Clavering and George Pitt, a right of wayleave from collieries in the Tanfield district to the rivers Tyne or Derwent was granted for 500 years from that date, on payment of 2s. 6d. for every ten of coals carried along the wagonways.[20] Dame Clavering died on February 22, 1735, aged 66.

Incidentally, this Chancery case[21] gives a good description of permanent way of the period, in the following terms: "For the making of waggon-ways the ground must be made as level as possible, without narrow turnings, and pieces of hard timber or wood called sleepers must be fixed in the ground, and raised some inches from the ground, for the wheels of the waggons to run on, and can be used only by waggons and not by carts." Here again we have the point

[20] Fordyce's *Coal and Iron*, p. 97.

[21] Pitt *v.* Clavering, *Plea and Demurrer of Dame Jane Clavering*, October 12, 1721.

brought out that special vehicles were required for use on the rail, and the cumulative force of these references by different writers and in a variety of circumstances leaves little doubt that special flanged wheels were used on wagonways from their introduction into this country.

The families of Liddell and Montague became associated in the working of Blackburn, or Burdon Moor, colliery and leased the coal under the freehold lands of Thomas Dawson and William Davison at Tanfield, and of Ralph Clavering, junior, at Causey. They thereupon began to build the longest and most remarkable wagonway so far laid down. The works, described in 1739[22] as having been constructed "at the expense of may thousand pounds", included some large cuttings, an extensive embankment across the valley of Beckley Burn, and a single-arch stone bridge called Dawson's bridge or the Causey arch. This wagonway was visited in September, 1725, by William Stukeley, accompanied by Richard Gale, and the following account[23] of their visit has survived: "We saw Colonel Lyddal's coal-works at Tanfield, where he carries the road over valleys filled with earth, 100 foot high, 300 foot broad at bottom: other valleys as large have a stone bridge laid across: in other places hills are cut through for half a mile together, and in this manner a road is made, and frames of timber laid for five miles to the river side, where coals are delivered at 5s. per chaldron." Stukeley mentions loaded vehicles running by gravity down the wagonway, and being checked by a wooden brake lever on one wheel.

Wayleave difficulties eventually resulted in the establishment of the most powerful partnership that the coal trade has known. It was commonly known as the "Grand Allies" and comprised: (1) the Hon. Sidney Wortley Montague, his son, the Hon. Edward Wortley Montague, and Thomas Ord of Newcastle; (2) Sir Henry Liddell and Col. George Liddell (or Lyddal) of Ravensworth Castle; and (3) George Bowes,

[22] *Brief for the Coalowners*, February 1738/39.
[23] *Itinerarium Curiosum.*

of Gibside. The last named had estates at Marley Hill and Hedley, rights over Hedley Fell, a joint interest in Park Head colliery and, about 1725, purchased a colliery at Shield Row. The agreement of the Grand Allies was dated June 27, 1726, and was designed "to join some of their collieries and to enter into a friendship and partnership for the purchasing or taking other collieries, and for winning and working of coals thereout, and to exchange benefits and kindnesses with each other, upon a lasting foundation". This agreement gave the one powerful group a virtual monopoly of the most valuable mineral district in the north of England. The collieries specified were to be held in thirds from November 11, 1726, for a term of 99 years, the coals to be worked jointly, but led to separate staiths and vended distinctly.

Upon the entry of George Bowes into the group and the formal establishment of the Grand Allies, Bowes contributed his share of the expenses incurred "in making and erecting the bridge called Dawson's bridge, and of drifting into and winning the colliery called Mr. Dawson's colliery". As we have seen, work on the bridge had already been undertaken before the new partnership came into being, but the precise date when it was brought into service is unknown. It was built by Ralph Wood, a local master mason, and the date 1727 (presumably that of completion) formed part of the inscription "Ra. Wood, Mason, 1727" on a sundial built into one of the piers. A copy of the inscription was made in 1787, at which time a writer stated that the bridge had long been abandoned owing to the closing of one of the important collieries served by the wagonway which crossed it. (Plate XX.)

Apart from the wagonways already existing or under construction when the partnership was formed, the Grand Allies extended their main line to Beamish South Moor and Shield Row, a distance of eight miles from the river Tyne and the farthest that such wagonways to that river stretched. The districts immediately to the west were served by the lines of other owners running to the river Wear.

The Tanfield Moor coals of George Pitt came on to the line at Bowes Bridge, and practically the whole of the coals from Tanfield and the South Moor district passed over this wagonway to the Tyne at Dunston, where large covered staiths were built. By a famous agreement of January 21, 1731/32, between coalowners, 108,000 chaldrons were apportioned by the Grand Allies to their partnership collieries, and 17,000 to Tanfield Moor colliery. Thus 5/12 of the whole computed vend of the port for the year (301,000 chaldrons) must have passed along the wagonway, or an average of about 400 chaldrons a day. When the summer's vend was over, the Grand Allies laid by as many as 90,000 London chaldrons[24] in the Dunston staiths.

In February, 1740, the river Tyne was frozen over for some time, and on February 11, the principal coal fitters under Sir Henry Liddell, Edward Wortley, and George Bowes, set about 200 men to work cutting away the ice so as to open a channel from below Newcastle to the Dunston staiths, nearly $1\frac{1}{2}$ miles long. Although this was regarded as a hazardous undertaking, there was no fatal accident, and in about a week a passage was opened and keels loaded, enabling ships which had been waiting for coals to be despatched to London and other places.

In 1760, Dr. Richard Pococke, bishop of Ossory in Ireland, a great antiquary, in the course of a tour through the North of England, visited Gibside, then the seat of George Bowes, and in the account of his travels he speaks of the wagonways, and the (to him) curious methods of conveying coals from the pits in the district to the riverside.

A manuscript has survived containing "An Account of Coals Ledd to Dunston Staith and Delivered there on account of Sir Thomas Clavering, Bart. March to December, 1767, and December, 1779, to December, 1780."

The main wagonway consisted of a single line of rails, of 4ft. gauge, with passing places or "bye-ways". As

[24] *Brief for the Coalowners*, February 1738/39.

already indicated, the Causey arch was not the only prominent engineering work on this important system of wagonways. The embankment at Beckley Burn was 100 ft. high and 300 ft. broad at the base. Its construction necessitated making a drift through the rock for the course of the diverted stream. The embankment now carries the Tanfield branch line and is probably the oldest railway embankment in the world still in use. The Causey arch itself is a slightly flattened arch of 103 ft. span built of freestone. It is 35 ft. high from a base line through the springing points to the underside of the arch and about 10 ft. thence to the road surface. The road itself is about 22½ ft. wide and formerly accommodated a double track timber railway of 4 ft. gauge.

Practically all the coal from the Tanfield and the South Moor district at one time passed over the wagonway to the Tyne. We have seen that in 1732 an average of about 400 Newcastle chaldrons (each of 53 cwt.) a day was conveyed and it may be supposed that this quantity had increased when the line was visited in 1765 by M. Gabriel Jars, of the Royal Academy of Sciences at Paris; he recorded in *Voyages Metallurgiques* that "it was almost always covered with wagons". Incidentally, we are indebted to M. Jars for recording the 4 ft. gauge with precision when he says that the rails were thus placed at this distance from each other "la largeur interieure du chemin".

The description by M. Jars of permanent-way construction at that period is very interesting, and the following is a rough translation from his *Voyages Metallurgiques* of the pertinent section: "When the road has been traced at 6 feet in breadth, and where the declivities are fixed, an excavation is made of the breadth of the said road, more or less deep, according as the levelling of the ground requires. There are afterwards arranged along the whole breadth of this excavation pieces of oak wood, of the thickness of 4, 5, 6, and even 8 inches square; these are placed across, and at the distance of 2 or 3 feet from each other; these pieces

need only be squared at their extremities, and upon these are fixed other pieces of wood, well squared and sawed, of about 6 or 7 inches breadth, by 5 inches depth, with pegs of wood; these pieces are placed on each side of the road along its whole length: they are commonly placed at 4 feet distance from each other, which forms the interior breadth of the road." M. Jars also described and illustrated (Fig. 1) the mine wagons in use at Newcastle and particularly the large wheels which were either of solid wood or of iron with spokes, and with flanges from 1 in. to $1\frac{1}{2}$ in. in depth. He added that the size of the front and back pairs should be unequal (the front pair being the larger) in order to maintain horizontal the load of coal in the wagon which always travelled on a slope in the same direction. Jars also illustrated turntables (Fig. 2).

The earliest map to afford us direct help is the "Plan of the Collieries on the River Tyne and Wear, taken from actual surveys by John Gibson, 1788"—see Fig. 3. This shows wagonways and their lengths between pit and staith, but indicates comparatively few places, and shows roads not always identifiable. Nevertheless, it is a good map, and is probably the oldest surviving general railway map of a wide area. South of the Tyne it seems to have been based on the map of "The County Palatine of Durham", surveyed by Captain Armstrong, and engraved by Thomas Jefferys, 1768—see Fig. 4. That did not show wagonways, but is of service to us as it enables many more places to be inserted on the Gibson map of 20 years later. In the reproduction of a section of the 1788 map (Fig. 4) the place names inserted from the 1768 map are indicated by dotted panels. The Main Way from Pontop to Derwenthaugh is clearly shown, and also the Old Way (and extension) from South Moor and Shield Row to Dunston staiths. It will be seen that they are not linked, excepting by a branch from each meeting on Tanfield Moor. That to the Main Way appears to have been built in 1768, for Sykes[25] records under the

[25] *Local Records*, by John Sykes.

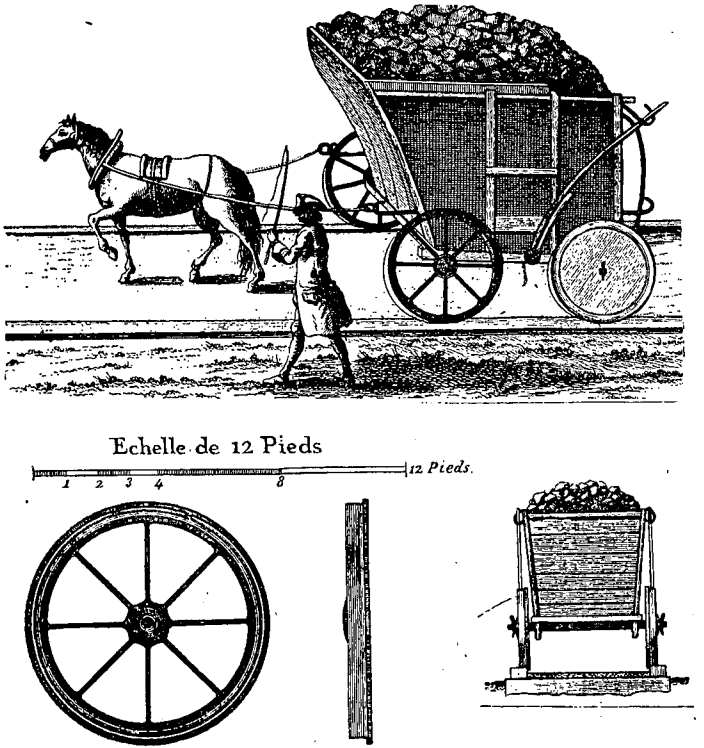


FIG. 1. Coal wagon on 4-ft. wagonway in County Durham (with enlarged details of the flanged iron wheels) from *Voyages Metallurgiques*, by Gabriel Jars (1765).

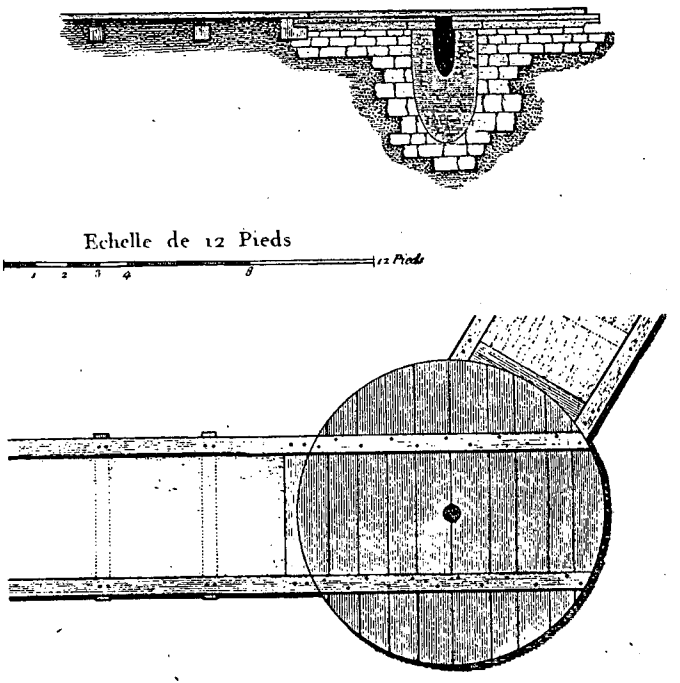


FIG. 2. Wagonway turntable illustrated by Gabriel Jars in *Voyages Metallurgiques* (1765). The gauge is shown by the scale, and in the text, to be 4 ft.

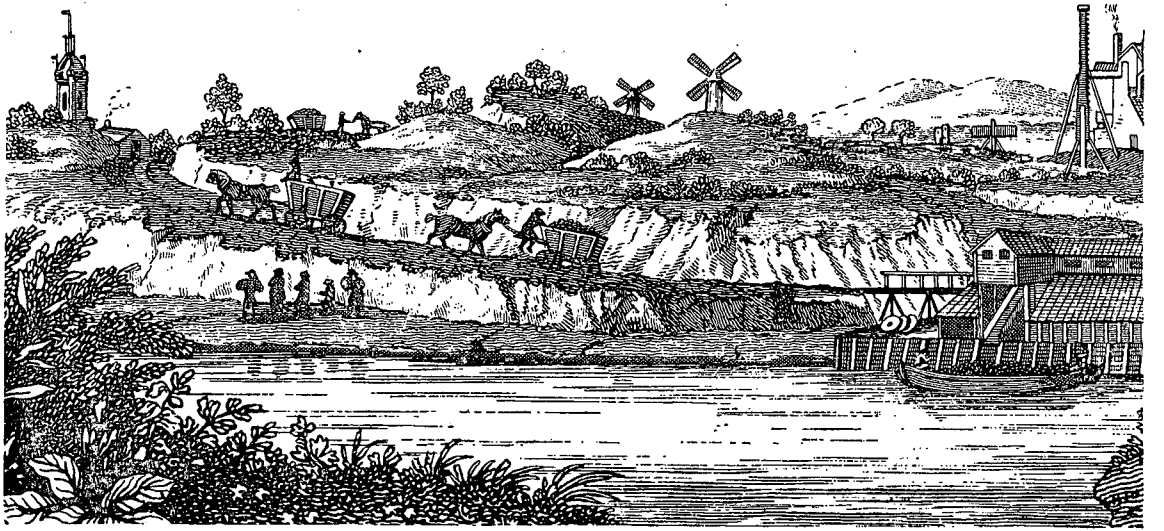


FIG. 3. A double-track wagonway shown on part of the engraved title to a "Plan of the Collieries on the Rivers Tyne and Wear", published in 1788 from surveys by John Gibson.

date June 14, 1768, that the coals from the new-won colliery at Tanfield Moor, belonging to the Earl of Kerry, were conveyed down to the staith at Derwenthaugh.

By the beginning of the nineteenth century a direct link had been built between Burnopfield and the neighbourhood of Marley Hill, enabling Pontop coal to be conveyed to Dunston. This is depicted on a "Plan shewing Collieries and Waggonways on the Rivers Tyne and Wear, prepared from a plan published by W. Casson, March, 1801", of which a portion is reproduced (Fig. 5). Another change from 1788 is the inclusion of a branch from Rowland's Gill to Thornley. Casson's map is very sketchy, and not to scale. John Cary's "New Map of Durham", published on September 28, 1801, shows no railways, but indicates the roads around Tanfield as generally similar to those shown by Armstrong in 1768.

A "Map of the Railways in the Newcastle on Tyne Coal Field in 1812", also sketchy and not to scale, shows a fundamental difference in the lines we are considering (see Fig. 6). The portion of the Main Way between Burnopfield and Rowland's Gill had been abandoned, and Derwenthaugh was no longer the staith for the Pontop coals as it had been for a century; the line west of the river Derwent remained to serve Thornley. By means of the new link shown in 1801, Pontop coals now went only *via* the Old Way to Dunston. The "Map of the County of Durham, from actual survey made in the years 1818 and 1819", by C. Greenwood, published on March 1, 1820, indicated wagonways by a distinctive line, but marked few of them specifically as such. Now the wagonways were shown for the first time in a form recognizable in relation to modern scaled maps. The same shape was given on the Nichols, Priestley and Walker canal and rail road map of January 1, 1830, and this takes us up to the beginning of the period of public railways in the area, and the replacement by iron railways of the old wooden wagonways. It appears that, shortly afterwards, the lines south-west of Marley Hill, to

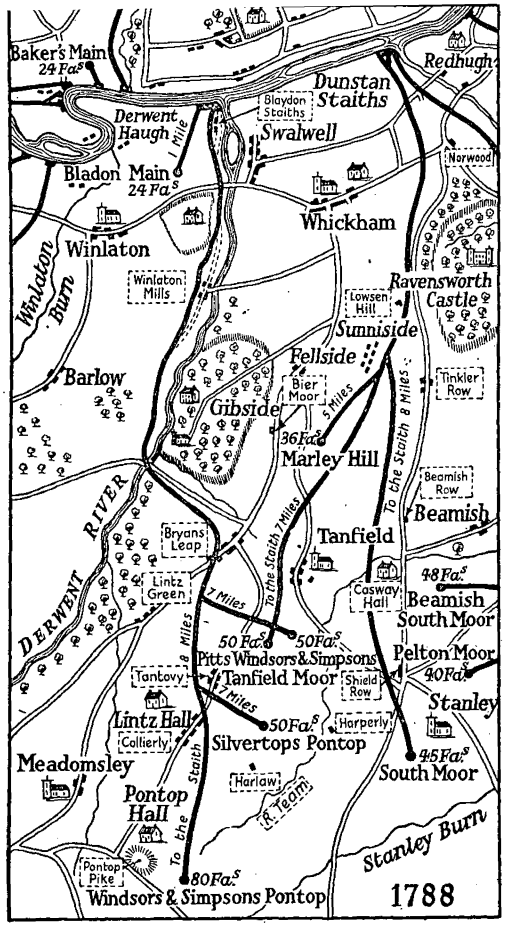


FIG. 4.

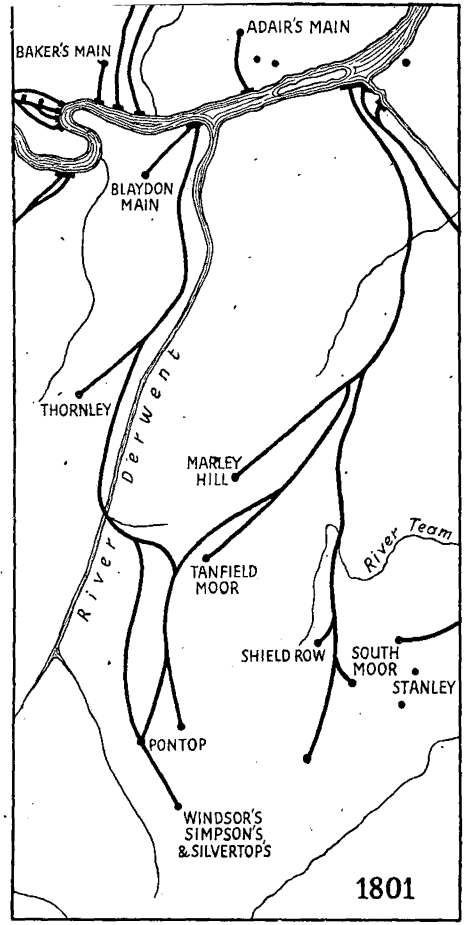


FIG. 5.

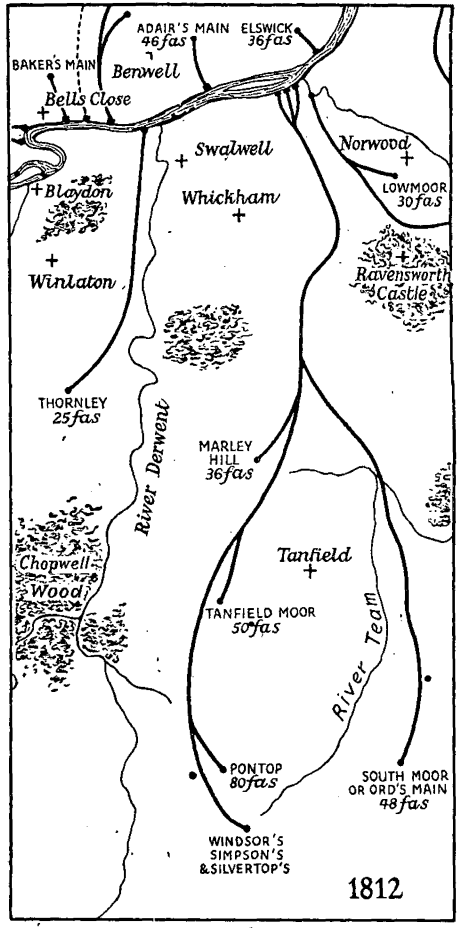


FIG. 6.

Tracings from three early railway maps of County Durham (see accompanying text for descriptive notes).

Burnopfield and Pontop, fell into disuse. Pontop colliery, which had been worked by the Marquis of Bute, and a landsale pit at Medomsley, were advertised to be let, according to the *Newcastle Courant* of February 5, 1831.

The next railway development in the district was the formation on January 30, 1832, of a partnership entitled the Stanhope Railroad Company to build an iron railway, under wayleave, from Stanhope to Consett, and to link up with the Pontop and Tanfield wagonway in order to secure access to the Tyne. This undertaking became the Stanhope and Tyne Railroad Company on June 1, 1832, when it had been decided to have a separate approach to the river, at South Shields. Eastwards of Kyo to the Durham turnpike road, near Pelaw Grange, the Stanhope and Tyne Railway had intended to adopt as part of its line the old Beamish wagonway (built in 1763 to the 4 ft. 4 in. gauge) which not long before 1832 had been relaid with iron rails in substitution for wooden ones. The Stanhope and Tyne would have reached the Beamish line by following the course of the old Shield Row wagonway; made an agreement with Major Swinburne for a right-of-way through his lands of Kyo and Pea; and opened negotiations with Morton John Davison for the purchase of his railway. Failing to come to terms with him, the S. and T. fell back on a route by way of West Stanley to Stella Gill, and thence to the Durham road, along what was practically the course of the first wagonway laid down in the Wear district, namely, that from Pelton Fell or Flatts colliery laid in 1693 by Thomas Allan.

The Stanhope and Tyne Railway formed the subject of articles in *The Railway Magazine* for July-August and September-October, 1942, and it is therefore sufficient to record here that the Stanhope-Annfield section was opened on May 15, 1834, and the Annfield-South Shields section on September 10, 1834. A branch from Annfield to Tanfield Moor was opened in 1835, using in part the track of the Harelaw Wagonway branch of the former Main Way, and for nearly six years the Tanfield Moor coals were

conveyed along the Stanhope and Tyne Railway to South Shields. By the end of 1840 the company was bankrupt through high wayleave payments and other financial difficulties, and was dissolved on February 5, 1841. Early in 1842 the portion of the main line between Stanhope and Consett (then called Carr House), together with the Stanhope Limestone quarries, was sold to the Derwent Iron Company, and on May 23, 1842, a new company called the Pontop and South Shields Railway was incorporated by Parliament to take over the section indicated by the title.

Meanwhile, the Royal Assent was given on May 22, 1834, to an act incorporating the Blaydon, Gateshead and Hebburn Railway Company, with powers to build 10½ miles of railway, comprising a main line from the Lead Refinery, Blaydon to Hebburn Quay, with various short branches, including one from the west end of Redheugh Quay to the Gateshead and Hexham road near Emery Crook, and another from Askew's Plantation, Low Team, to the Team Iron Works. It was provided that the Redheugh Quay to Emery Crook and the Low Team to Team Iron Works sections were not to be made without the consent of Lord Ravensworth. At the first general meeting of the company, held on July 9, 1834, a board of directors was elected which included John Brandling (who became chairman on July 22), Benjamin Thompson, and Nicholas Wood.[26] John Blackmore was appointed Engineer.

A proposal was made by the company on July 2, 1834, to the owners of Tanfield Lea colliery for leading their coals. The new railway company was to have the use of Tanfield Lea Wagonway from its junction with the South Moor colliery line, paying the wayleaves, etc., and leading the coals from Bute Pit to Hebburn Quay for 5s. 9d. a

[26] Nicholas Wood was a celebrated mining engineer. He was born on April 24, 1795, when his father was mining engineer for Crawcrook Colliery. Nicholas Wood became Viewer for the Grand Allies at Killingworth Colliery and there formed a close friendship with George Stephenson. The two visited Edward Pease on April 19, 1821, in connection with the Stockton & Darlington Railway. In 1825, when only 30 years old, Wood published his famous *Practical Treatise on Rail-Roads*. He died on December 19, 1865.

chaldron, according to the "Report on the Affairs of the Brandling Junction Railway", 1843. An agreement was subsequently drawn up on these lines binding the company to relay the old Tanfield and Tanfield Lea wagonways, and thus make a new branch about 6 miles in length, before December 31, 1836. However, the Blaydon and Hebburn Railway was so dependent upon other projects, some of them still in the air, that the directors were unable to proceed at once with any construction work. Eventually the Blaydon and Hebburn Railway solved its difficulties in September, 1836, by accepting an offer from the Newcastle and Carlisle Railway to take over its works and powers, and fulfil its obligations.

Meanwhile, in May, 1835, Messrs. John and Robert William Brandling, the lessees of an extensive coal district behind South Shields, had promoted competitive railway schemes. The powers they secured under an act of July 30, 1835, and the wayleaves they were able to secure, were taken over by the Brandling Junction Railway Company (formed in September, 1835). Shortly afterwards, the scope of the company was enlarged by an agreement with the Newcastle and Carlisle Railway (authorized at a meeting on February 19, 1836), whereby, in consideration of £9,000 to be paid to the Newcastle and Carlisle Railway and the fulfilment of certain engagements, the Brandling Junction Railway secured the abandonment of a competing line and obtained the assignment of a beneficial contract for the supply of iron rails. The engagements were: to form a railway eastward from the point where the Newcastle and Carlisle Railway intended crossing the Tyne (or any other point which might be agreed between the two companies); to re-lay the old wagonway to Tanfield Lea colliery and convey the Marquis of Bute's coal to Jarrow, compensating him for any loss sustained by the non-completion of the branch at the date fixed; and to build the Blaydon and Hebburn line to Jarrow and form shipping places there.

As the cost of its other works had exceeded the esti-

mates, the Brandling Junction Railway proposed to abandon the Tanfield Lea branch, which it had begun to re-lay on May 3, 1837, but the Marquis of Bute (owner of Tanfield Lea colliery) brought a successful action against the company to compel it to effect the work. Accordingly, from February 6, 1839, the Brandling Junction Railway resumed re-laying the old Tanfield Lea wagonway between the colliery and Lobley Hill (5¼ miles) and was actively engaged in making a short connecting line (¾ mile) between it and the Team branch. Leaving some of the heavier works to be finished afterwards, the company began the leading of coals on November 26, 1839, employing horses on those parts of the line which were intended to be worked by stationary engines. By its non-fulfilment of the contract with the Marquis of Bute to have the Tanfield branch ready by December 31, 1836, the company rendered itself liable to compensation for not carrying the coals to Jarrow, and also to meet the extra expense incurred in continuing to lead the coals to Dunston along the old wooden wagonway. The amount of the compensation was £4,000, and the extra expense brought the total up to £7,407 14s. 6d., according to a "Report on the Affairs of the Brandling Junction Railway", 1843, pp. 13-14. The rehabilitation of the Tanfield line appears to have been completed in 1842. Thus the oldest railway in the world was relaid with iron rails and converted to standard gauge of 4 ft. 8½ in. The cost of the works of the Tanfield branch was £14,024 4s. 11½d. for iron rails, chains, ballasting, etc.

As we have seen earlier, the Tanfield branch was a wayleave line, of which the greater portion ran through the estate of Lord Ravensworth. Rising 536 ft. in 3¼ miles and falling 90 ft. in 2¼ miles, the line consisted of a series of gradients varying from 1 in 12 to 1 in 454, which involved several changes of motive power. Between Rédheugh and Tanfield Lea there were three horse planes, namely, at the Teams (⅞ mile), at Lobley Hill (½ mile), and at Tanfield Lea (⅝ mile); three engine planes, the Sunnyside incline (1 mile),

the Causey Wood east incline ($1\frac{7}{8}$ mile), and the Causey Wood west incline ($\frac{1}{4}$ mile); and two self-acting inclines, the Lobley Hill incline ($\frac{5}{8}$ mile) with a gradient of 1 in 18, and the Fugar Bar incline or Baker's Bank (1 mile) with gradients of 1 in 12 and 1 in 21.

The Tanfield Moor coals continued to reach the water over the Stanhope and Tyne Railway, but, when the Brandling Junction Railway had reached Tanfield Lea over the old wagonway, it saw its way to secure this traffic. Heads

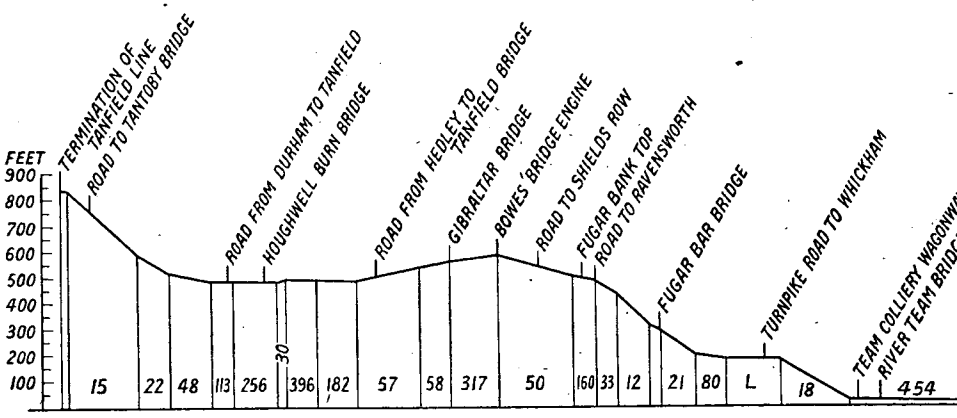


FIG. 7. Gradient profile of the Tanfield and Tanfield Moor branch of the Brandling Junction Railway showing a rise of 800 ft. in $6\frac{1}{2}$ miles.

of agreement were arranged on May 25, 1840, by John Buddle (on behalf of William Pitt) and Nicholas Wood (on behalf of the Brandling Junction Railway). The railway company undertook to lay a branch line from the Tanfield Lea Railway to join the Tanfield Moor Colliery Railway, and to convey the coal in its own wagons from the colliery boundary to Shields and pay the intervening wayleaves, for 6s. 6d. a chaldron of 53 cwt., subject to having the carriage of all coal worked out of the Tanfield Moor royalty. The branch was to be ready for work not later than November 11, 1840. This section of the Brandling Junction Rail-

way ($1\frac{1}{8}$ miles) was actually opened for mineral traffic on November 11, 1840, according to the Report of the Engineer to the Brandling Junction Railway Company dated February 22, 1841.

The Tanfield Moor branch was an extension line, rising from Tanfield Lea to Whitelee Head on gradients of 1 in 22 and 1 in 15 to $823\frac{1}{2}$ ft., according to a profile (see Fig. 7) of the Brandling Junction Railway and Branches, dated 1844; this allowed it to be worked by gravity. It formed the last of the series of inclines, which, representing a difference of level of 800 ft. in $6\frac{1}{2}$ miles, makes the Tanfield branch a most interesting line. By means of this short branch, the Brandling Junction Railway was enabled to divert to its own line and shipping places the Tanfield Moor coals which for six years had been conveyed along the Stanhope and Tyne Railway to South Shields. In consequence of this diversion of traffic, $1\frac{1}{4}$ miles of the latter railway, between Tanfield Moor and Harelaw, fell into disuse. Though the Tanfield line was opened throughout, it was not until March 1, 1841, that the company was able to make use of the stationary engines in the conveyance of its coal traffic.

After the Stanhope and Tyne Railway had been split into two parts at Pontop, the position changed. In 1843 the Brandling Junction Railway was still energetically enlarging its traffic-gathering area by means of private railways, and on December 26, 1843, the Derwent Iron Company opened a $1\frac{1}{4}$-mile junction line between Harelaw and Tanfield Moor. This enabled the Brandling Junction Railway to secure lead and lime traffic from the former western section of the Stanhope and Tyne Railway, and also gave it access to the newly-founded Consett Ironworks.

The Brandling Junction Railway had already made another use of the old Tanfield wagonway by introducing a passenger service between Tanfield Lea and Gateshead on June 18, 1842. There were four recognized stations, namely, Redheugh, Fugar Bar, Bowes Bridge, and Tanfield

Lea, and one unofficial stopping place at Green's Field Close (turnpike road to Whickham) at the engine house. At first a passenger carriage was used, but afterwards coal trucks were substituted. The fares from Gateshead were 6d. to Fugar Bar or Bowes Bridge, and 9d. to Tanfield. The passenger train ran only on Saturdays, leaving Tanfield Lea at 9 a.m. and reaching Gateshead at 10 a.m. It left Gateshead on the return journey at 4 p.m. Further uses by the Brandling Junction Railway of old wagonways—though in an area to the east that we are considering in detail—were to draw traffic from Birtley and Urpeth by means of the Pelaw Main wagonway, and to convey passengers to and from Jarrow by horsepower over the Springwell wagonway. The Pelaw Main line was opened on May 17, 1809, from Bewicke Main (Urpeth colliery) to the Tyne at Poulters Close, Hebburn. This included at Birtley Fell the first fixed engine ever used for hauling wagons. It was built by Samuel Cooke, one of the owners (Harrison, Cooke and Company) of the colliery. A self-acting plane at Whitehouse (or Whitehill), 1,600 yd. long, was brought into use on March 15, 1810. A new southern portion of the Pelaw Main wagonway (at first called the Bewicke Main wagonway) was made in 1815, involving the construction of the Birtley and Blackhouse planes, up which coals from Ouston colliery were drawn for the first time on November 17, 1815. The major portion of the Pelaw Main wagonway survived until coal nationalization as the property of the Pelaw Main Collieries Limited, and operated under a system of wayleaves.

The Springwell wagonway to Jarrow was built as an entirely new line in 1825 to serve the new Springwell colliery of Lord Ravensworth and Partners, who already owned the neighbouring Mount Moor colliery. The latter had a wagonway to the River Wear, opened nearly a century earlier. The Springwell line was opened on June 17, 1826, and its early Stephenson locomotives formed the subject of a paper to the Newcomen Society in London by Mr. E. A.

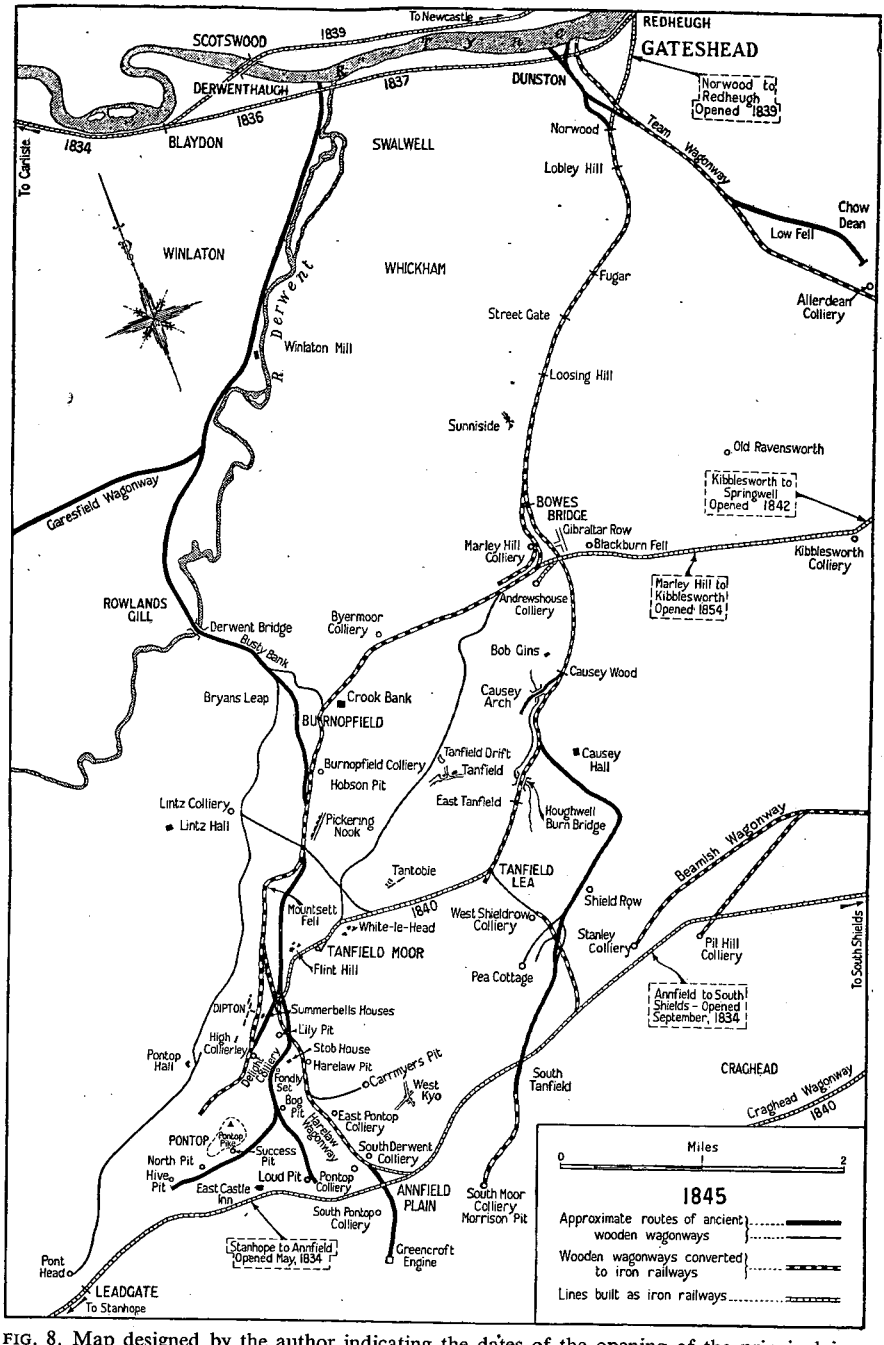


FIG. 8. Map designed by the author indicating the dates of the opening of the principal iron railways completed by 1845, and also the approximate routes of the ancient wooden wagonways,. by then mostly abandoned.

Forward on April 21, 1943. The passenger service appears to have been begun in 1843, and extended from a station called Springwell (east of Pelaw Station) on the Gateshead-Monkwearmouth line, to a point near where the present Jarrow Station stands. Here it may be remarked that the original Springwell wagonway reached the Tyne near Jarrow Slake, and was moved westward in Jarrow to its present position in 1880. This passenger service consisted of five trains on week-days and four on Sundays; the first time-table I have traced is dated July 1, 1845. It appears to have been horse drawn for a time, but locomotives are also stated locally to have been used. The Pelaw-Jarrow-South Shields line of the North Eastern Railway was opened on March 1, 1872, and rendered unnecessary the branch service to Jarrow on the old wagonway. Springwell Station was abolished and the wagonway carried passengers no more. Two dates may be given here to complete the record. The Brandling Junction Railway was absorbed in 1845 by the Newcastle and Darlington Junction Railway, which eventually became the North Eastern Railway. Springwell colliery and its wagonway were purchased by John Bowes and Partners in 1850.

Our story now returns to its original Tanfield area. The Marley Hill colliery appears to have been abandoned by the Grand Allies (Lord Ravensworth and Partners) in 1815 as unprofitable, and about this period the wagonways westward of that point (to Burnopfield, Dipton, and Pontop) became disused. A quarter of a century later there was a revival of the coal trade of the district, and at first the coal all passed along the ancient Tanfield branch. In 1840 Andrews House colliery began shipping coal at South Shields, and used this route. Then in 1841-42, the Marley Hill colliery was re-established by a company called the Marley Hill Coal Company, consisting of John Bowes, William Hutt, and Nicholas Wood. In 1844 steps were taken to re-connect Hobson pit (Burnopfield) with Marley Hill by rail, and the old wagonway was relaid. A note in

Cuthbert Berkley's memorandum on Tanfield Moor colliery dated September 10, 1844, states that a contract was let for laying the line with round and slit larch sleepers 7 ft. long × 6 in. × 4¼ in. from the Marley Hill colliery branch to the Hobson Pit, and another note in the same memorandum, dated December 5, 1844, records the letting of a contract to Martin Proud for "the reformation of a piece of the embankment of the Hobson Pit Railway which had been destroyed by the working of a stone quarry at Crook Gate, for the sum of twenty-two shillings and sixpence; if not completed, on or before the day when wanted, a penalty of five shillings to be paid". Presumably these prices were "per yard".

The firm of John Bowes and Partners was formed in 1847 to take over the Marley Hill Coal Company, with the same partners and the addition of Charles Mark Palmer. This partnership purchased Hobson colliery in 1850, Springwell colliery in 1850, Kibblesworth colliery in 1852, and Greencroft and Andrews House in 1854. The old derelict railway from Hobson (Burnopfield) to Dipton, part of the original Main Way, had been taken in hand for rebuilding in 1842 by the former owners of the Burnopfield colliery, and the work was completed by John Bowes and Partners in 1855.

An extension of the Springwell wagonway was made in 1842 from Springwell to Kibblesworth by the then owners of Kibblesworth colliery (John Watson, George T. Dunn, Robert White, James Joicey, and G. Southern). Southern was the managing partner and viewer of the colliery, and he opened the line on May 30, 1842. It is stated to have been worked at first by a stationary engine of 80 h.p. erected at Black Fell, which wound a rope 2,200 yd. long. The line passed "underneath the new carriage road at Longacres, also underneath the Durham old and new turnpike roads". When this railway became the property of John Bowes and Partners in 1852, they decided to build the connecting link between their two railway systems, from Kibblesworth to Marley Hill, and thus have direct access to their own staiths

without the necessity for the western group of collieries using the Tanfield branch. This link was completed in 1854, and rounded off the systems of coal railways from the Tanfield area to the Tyne in substantially their present form. Upon the death of John Bowes (the last survivor of the three original partners) the firm was converted into a limited company as John Bowes and Partners Limited on July 21, 1886, with Sir Charles Mark Palmer as chairman. The combined sections of railway became known as the Pontop and Jarrow Railway, which since the abandonment of the passenger service on the Jarrow section in 1872, has been confined to mineral traffic. In 1932, the name Bowes Railway was adopted by the owners, which was a happy change, as the members of the Bowes family on the board of directors were near kinsmen of our Queen. The ownership of this railway was transferred to the National Coal Board on January 1, 1947.

The Tanfield line survives as a branch of British Railways and includes a substantial portion of the original Ravensworth wagonway, which has been carrying traffic, and has played an important part in the conveyance of coal to the Tyne staiths, for roundly three hundred years. The Causey Arch (Plate XX), which has good claim to be regarded as the oldest railway bridge in the world, was scheduled in 1935 as an Ancient Monument of national importance.

On the north bank of the Tyne, between Wallsend and North Shields, an extraordinary maze of wagonways and railways has been built during the past 250 years to meet the changing needs of the great Northumberland coalfield, of which the one constant factor is the necessity for conveying coals rapidly and cheaply to the river staiths. Some of these lines, after long and useful careers, lie derelict and almost forgotten, while others have survived extension and modernization, and are to-day highly efficient mineral railways handling heavy traffics.

One of these lines is of more than local interest, as it is the ancestor of two important features of the modern

public railway, namely, the standard track gauge of 4 ft. 8½ in. and the steam locomotive relying on adhesion. This is the Killingworth wagonway, upon which George Stephenson won his early fame. He was responsible for neither its construction nor its gauge, although his adoption of the latter (with a trifling variation) for railways in many parts of the world, and his subsequent advocacy of its standardization, have resulted in 4 ft. 8½ in. being known widely as the Stephenson gauge.

It would be impracticable here to deal even briefly with all the Northumberland wagonways, but a survey of the lines running to points "below bridge" gives a good idea of the principal stages in the development of this important form of transport.

Bigges Main and Coxlodge Wagonways

The earliest of the Northumberland wagonways leading to staiths below Newcastle appears to have been one approximately on the line of the Coxlodge wagonway. It is shown on a "Plan of Long Benton Estate belonging to Lord Carlisle", dated 1749, and begins at Gosforth Engine (on the west of the Ouse Burn, just south of Salter's Bridge). Thence it follows a course similar to that of the later Coxlodge wagonway, but on a slightly different alignment, towards Wallsend, through the grounds of Bigg. The estate plan does not extend very far south, and the writer has failed to trace the precise route by which the river was reached. This colliery appears to have been exhausted by 1766, and doubtless the wagonway became disused. The Counsel's opinion of 1763 upon a conveyance dated 1672, relating to the South Gosforth and Coxlodge collieries, and recording the invention of wagonways "some short time before this conveyance", has been referred to already.

Messrs. Bells and Brown, who sank the engine pit at Willington in 1775, established the Bigges Main colliery in 1784 and sank three shafts, which they linked by a

wagonway with Wallsend.[27] In Gibson's "Plan" of 1788, there is no trace of the line from South Gosforth, but there is one from Bigges Main to Wallsend, $1\frac{1}{4}$ miles, and, incidentally, another from Bigges Main to Willington. That from Bigges Main to Wallsend is also shown on Casson's "Plan" of March, 1801 (although apparently not extending quite so far as Billy Pit, where it seems to have terminated in 1788), but the Bigges Main to Willington line has disappeared. The Bigges Main wagonway was probably the descendant of a portion of the old Gosforth line.

By the time the sketchy map of 1812 was prepared, the Kenton and Coxlodge wagonway had been built, branching off from the Bigges Main wagonway, and extending through Gosforth to serve Coxlodge, East Kenton, and Fawdon. It seems that this line was built first to serve East Kenton, which previously had used an underground railway to Scotswood that deserves notice here.

This is the earliest "underground railway" of which we have any detailed description, and probably the first in the world, apart from small mineral lines running into adits. It is depicted on Casson's plan in 1801, by which time it had existed for three decades. Kenton colliery is of considerable antiquity, and in the early part of the seventeenth century employed some 400 to 500 carts and wains in carrying coal from the pits to the Tyne. The 3-mile underground railway—or "subterraneous wagonway"—was begun about 1770 by Christopher Bedlington, and was therefore commonly known as Kitty's Drift. It extended to the Tyne at Bell's Close (near Scotswood Bridge). The builder is stated to have been a partner in Liddel, Bedlington and Company, the then owners of East Kenton colliery, and is also referred to as the agent to the Montague family of colliery owners, through whose estate the railway ran. Most of our knowledge of the line in its working days is derived from descriptions in *The Picture of Newcastle-upon-Tyne* (1807) and in *The Cyclopædia* by Abraham Rees (article "Coal",

[27] *Northumberland County History*, vol. XIII.

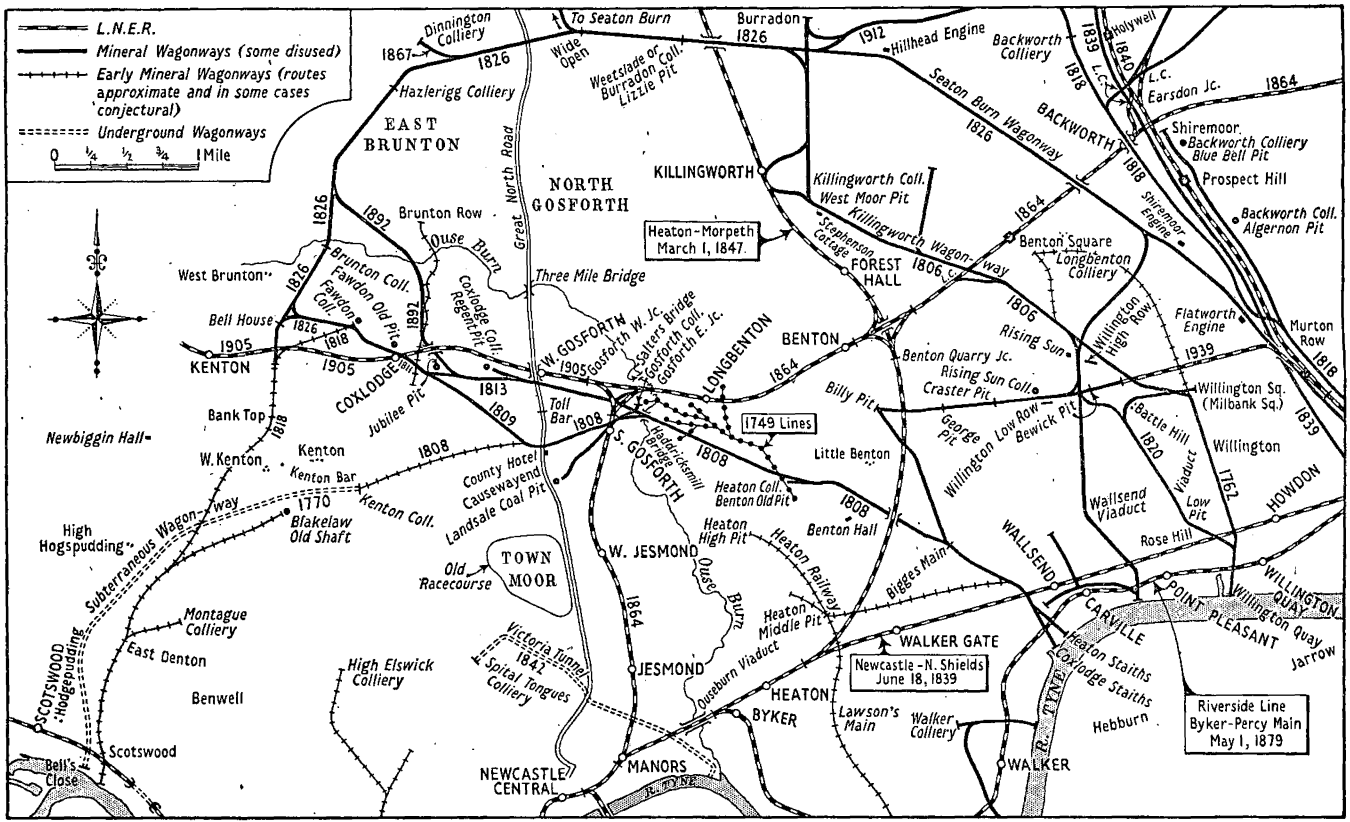


FIG. 9. Historical map showing the approximate routes of the principal Northumberland wagonways within 5 miles of Newcastle.

Vol. VIII, dated 1819) from which the following quoted particulars are extracted.

The pit, "which can be entered with the greatest ease and safety, is in the vicinity of Newcastle, *viz.* East Kenton colliery, the property of Messrs. Knowsley and Chapman. Having previously obtained permission of a viewer, or some other person concerned in the colliery, a small hand lanthorn must be provided, a light being necessary for each person. It is also advisable to take a change of dress, at least of upper cloaths; strong boots to keep the feet dry, and an old hat. Being thus prepared, proceed to the steath, which is by the river side, about four miles above Newcastle, a pleasant excursion by water.

"When there, some of the men, who have been apprised of your coming, will assist in seating you on a set of small empty coal waggons, capable of containing two persons each, seven of which are drawn along a railway by one horse. As soon as you are placed, with your candles lighted, you set off at full speed, with a boy in the first waggon, for a charioteer, into a tunnel, or subterraneous passage six feet high, about the same breadth, and three miles in length. It is particularly necessary to guard against putting your hands suddenly out of the waggon, as the tunnel, in most places, is only wide enough to admit the waggon and horses, and you are of course by doing so in danger of receiving an injury; but by sitting quietly, you ascend very smoothly, till you arrive at the place where the men are at work.

"At your first entrance into the tunnel you are struck with the noise of the waggons, which, being fastened with chains to each other, and going sometimes at the rate of ten miles an hour, make a sound resembling thunder. The passage is in general hewn out of solid rock, composed of metal stone, a sort of schistus. Where there is not rock, it is arched with brick or stone. The water from the pit runs down by the side of the rail-way to the river Tyne.

"The waggons are deep and square; wider at the top than at the bottom, and are fast at all sides. The bottom has hinges, and can be let down to discharge the coals, of which these waggons contain about three bolls each.

"At intervals there are double rail-ways; and where you come to one of these your driver stops his horse, and a dead silence ensues; he then calles aloud, and listens to hear if any loaded waggons are coming down, that they may there pass each other: the candle of the boy coming down appears like a star at a distance through the gloom, and has a very pleasing effect as it gradually approaches. When he is past, your driver renews his

speed, until he reaches the next interval, when he repeats his call, and should no answer be heard in return, he proceeds. If, by the negligence of the boys, the waggons should meet where there is no double rail-way, the boy with the empty waggon unlooses his horse, which is taught to turn round, and force the waggons back with its breast, until they reach the double part, where they can pass each other.

"The air up the tunnel is cold, but perfectly pure, but as you approach the workings a considerable degree of warmth is felt."

The railway through Kitty's Drift was abandoned in favour of the system of loading coals direct from the wagons into the ship's hold, and a surface wagonway was constructed, during the first decade of the nineteenth century, which crossed the Great North Road at the County Hotel, Gosforth, and ran down the back of Roseworth Terrace, by the church, to a junction with the older Bigges Main wagonway, by means of which it reached the Tyne at Wallsend. Kitty's Drift continued to prove of service as an outlet for mine water, but its railway days were over. So far as can be ascertained, only wooden rails were used in the tunnel.

The approximate course of the new Kenton wagonway to Wallsend is shown on the accompanying map (Fig. 9). Westward of the Great North Road this is mainly conjectural, as most of the area has since been built up into modern Gosforth. Moreover, this portion had a very short life, for it was built only about 1808, and had been abandoned and disappeared ten years later. It is shown in very sketchy form on a small-scale colliery map of 1812. A branch to the Kenton wagonway was built in 1809 from Coxlodge (Jubilee pit) along the line of Shoulder of Mutton Lane (now Jubilee Road). Coxlodge colliery was begun by the Brandlings in 1807, and opened in 1809. Its first pit was named in honour of the jubilee celebration of King George III, held on October 25, 1809 (the 49th anniversary of his accession). This colliery was in effect a continuation of the old Kenton colliery, in conjunction with which it was worked after the purchase of the latter from Williams, the then

owner, in 1817. Kenton was closed shortly afterwards. The trade was transferred to Coxlodge, and the miners retained their houses. The old engine shaft at Kenton continued to pump water from the new royalties. It would appear that the combined names of Kenton and Coxlodge were preserved, and were used for both the colliery and the wagonway after East Kenton itself had been closed.

Under an award dated December 5, 1810, the owners of the Kenton and Coxlodge collieries were adjudged to "pay the Willington owners 3s. 4d. per ten of 440 Bolls per mile for the upkeep of the present Wood Railway, and 2s. 6d. per ten mile if metal rails be laid".

In his *History of the Parish of Gosforth*, published about 1879, Richard Welford gives the eastern part of the route of the Kenton and Coxlodge wagonway in 1815, "when news of the battle of Waterloo sent a thrill of joy through the nation". He says it crossed the Great North Road a couple of hundred yards north of Causey End, by the County Hotel, and ran down the back of Roseworth Terrace, by the Church, to Wallsend. This portion, as far as Haddricks Mill Bridge, is shown on a map of the Brandling estates in 1852, but was apparently long disused. Roseworth Terrace stands slightly to the north of The Grove.

Fawdon colliery was begun in May, 1810, and the high main coal was reached in May, 1811. At first it was linked with the Kenton and Coxlodge wagonway by an extension of the Coxlodge line, but probably no colliery made use of more devious routes to the waterside, or made so many changes in a few years, than Fawdon. It is not surprising, therefore, that the details are difficult to uncover, and that there is some lack of precision.

Rack rails and steam locomotives of the Blenkinsop and Murray types were introduced on the Kenton and Coxlodge wagonway on September 2, 1813. The following account is given by Sykes in his *Local Records*:

> "An ingenious and highly interesting experiment was performed in the presence of a vast concourse of spectators, on the

railway leading from the collieries of Kenton and Coxlodge, near Newcastle, by the application of a steam-engine, constructed by Messrs. Fenton, Murray and Wood, of Leeds, under the direction of Mr. John Blenkinsop, the patentee, for the purpose of drawing the coal wagons. About one o'clock the new invention was set agoing, having attached to it sixteen chaldron wagons loaded with coals, each wagon with its contents weighing four tons or thereabouts, making altogether an aggregate weight little short of seventy tons. Upon a perfectly level road the machine so charged, it was computed, would travel at the rate of three and a half miles an hour, but in the present instance the speed was short of that, owing no doubt to some partial ascents in the railroad. Under all the circumstances it was highly approved of, and its complete success anticipated. After the experiment was finished a large party of gentlemen connected with coal mining partook of an excellent dinner provided at the Grand Stand for the occasion, when the afternoon was spent in the most agreeable and convivial manner."

A memorandum of May 16, 1813, in connection with the preparations for this rack locomotive haulage (quoted in *The Engineer* of January 31, 1930) states: "Expense of keeping and working one of the travelling engines is estimated at £5 10s. per week including wear and tear of the same, and will take down the way from the pits to where the Kenton way joins Willington Waggon-way a distance of 3¾ miles." The total length of the Kenton and Coxlodge wagonway is given at 8,718 yd., or nearly 5 miles. This memorandum also gives some precise gauge figures, namely: "Width of inside of our way 4 ft. 7½ in.; do. outside 4 ft. 11½ in. Width between the waggon wheels at present used at Kenton colliery 4 ft. 4½ in." It will be noticed that this gauge differed by only ½ in. from the Willington and Killingworth gauge of 4 ft. 8 in., and that through-running between the two appears to have presented no difficulty. Incidentally, it is not clear how or where the Coxlodge wagonway joined the Willington line. The present writer is of opinion that the "Willington Waggon-way" mentioned here was what afterwards became known as the Bigges Main wagonway, which had actually had a

connection with Willington in earlier years, as shown on the 1788 map, but this connection was disused before the end of the eighteenth century. The west-east section was again brought into use, between "William" Pit and Willington, by 1828.

The suggested identification of "Willington Waggonway" with the Bigges Main wagonway presents no difficulties with either the distances quoted in 1813, or with topographical features as depicted on many maps, and as observable on the site. The 1813 memorandum gives the following intermediate distances:

Distance from	the Jubilee pit to the turnpike	1,397 yd.
„	„ turnpike to Ouse Burn bridge	1,446 yd.
„	„ the burn to staith	5,837 yd.
		8,680 yd.

The portion of the Kenton and Coxlodge wagonway west of Haddricks Mill Bridge was laid as a rack railway at this time (1813) on a new and direct course to Coxlodge, and opened, as we have seen, on September 2, 1813. The older route was abandoned either then or shortly afterwards. If Welford's Gosforth history be taken literally, it would seem to have continued in use (possibly for Fawdon traffic) at least until 1815. The Kenton and Coxlodge locomotives were laid aside in May, 1815, but their use was resumed on Lady Day, 1817.

The Fawdon colliery owners continued to use horse haulage, but linked their branch to the new rack railway, which they seem to have used until their own line to Scotswood was built in 1818. On being left with the exclusive use of the Kenton and Coxlodge wagonway, Brandling employed George Stephenson to improve the line, and he devised an ingenious combination of gravity and steam power which was first tried on October 5, 1818.

The wagonway from Fawdon to Scotswood was undertaken when Newmarch and Co. were lessees of Fawdon

colliery, as a dispute about wayleaves had arisen. It was built by Benjamin Thompson, and was quite new when it was visited by George Overton on January 18, 1819. At first the wagons were drawn by a fixed engine up an inclined plane to Kenton bank top, or Blakelaw, and then horse-hauled, so that there was apparently nothing unusual about the line, excepting its substantial construction with cast-iron rails. On December 14, 1821, however, Thompson secured a patent for his "reciprocating" system of working railways, using ropes and fixed engines for traction on the level, as well as on inclines. In a pamphlet dated January 3, 1822, he included a copy of the specification with "remarks thereon by the patentee, and the result of a trial of the invention". In this he said "preparations are further making for carrying the same method into use . . . on the waggon-way from Fawdon Colliery". Here he adopted his system of fixed engines for the section of one mile and three furlongs between the Kenton Bank and Hotchpudding planes; it was in use here until 1826, when the Brunton and Shields Railway was built, also by Thompson. This line, which became well known for his "costly experiments with half-chaldron coal wagons and cranes for lifting them", is dealt with later.

Josias Jessop considered the construction of the Fawdon-Scotswood wagonway "highly creditable to the skill and ingenuity of the contriver", and said it was "much better laid and maintained in a more perfect state" than any other wagonway he had seen. ("Report on the most desirable mode of improving the communication between Newcastle and Carlisle," 1825.) William Chapman also mentioned the reciprocating system at Fawdon in his "Report on the cost and separate advantages of a Ship Canal and of a Rail-way from Newcastle to Carlisle" (1824). A letter in the *Franklin Journal* (vol. III, 1827) mentioned the Fawdon line as follows:

> "The rope is placed in the jaws of a vice attached to the waggon, where it is secured. . . . Where the railway crossed a

public road, the rope was bent down by friction rollers and carried under a plank bridge, to the other side of the road, where it again rose above ground. When the waggon comes to the public road, the boy who rides on it released the rope from the vice; the velocity of the waggon carries it over the road, and the boy again hooks up the rope into the vice, while the waggon continues its motion."

A decade after the Fawdon coals had ceased to use the Coxlodge wagonway, that line gained a new customer in the Gosforth colliery, three miles north of Newcastle, and close to the earlier Gosforth colliery which we have seen had its own wagonway at least in 1749, and possibly as early as 1672. The sinking at Gosforth was begun in 1825, and coal was won in January, 1829. The coals were conveyed from the colliery, to the Tyne, about 3½ miles, by the owners of the Coxlodge Colliery, along the Coxlodge wagonway, and were shipped at the staiths of that colliery, for which a payment was made of 1s. 3d. per chaldron, which included spoutage and all other transit charges, but was exclusive of wayleave rents.

Fordyce (in *Coal and Iron*, 1860) said that Coxlodge colliery about ¾ mile west of Gosforth colliery, then owned a private wagonway from the colliery to the Tyne, about 4½ miles long, for which wayleaves were paid, and that coal from Gosforth and Benton collieries was led down this wagonway and shipped at the Coxlodge staiths, from which the colliery derived a revenue. Between Gosforth and the Tyne the Coxlodge wagonway passed over the estates of the Rev. Dixon Brown, the trustees of the will of the late Charles William Bigge, and of the Dean and Chapter of Durham, to whom the following certain wayleave rents were paid respectively by the owners of Gosforth colliery: To Brown, £200 a year, for which the right or privilege was granted of leading an equivalent quantity of coal at the rates of 2s. 5d. per ten for round, and 1s. 3d. per ten for small coal, and paying for overleadings at the same rates; To Bigge's Trustees, £160 a year for leading equivalent quantity

at 3s. per ten round, 1s. 3d. for small, and like rates; To Dean and Chapter, £200 a year (at 3s. per ten round, and 1s. 3d. for small) and like rates.

On October 6 and 7, 1852, the extensive estates of North and South Gosforth, Seaton Burn, and Coxlodge, the property of the Rev. Ralph Henry Brandling, were sold by auction at the Queen's Head Inn, Newcastle, by Order of the Court of Chancery. Gosforth and Coxlodge collieries and royalties were withdrawn. Coxlodge became the property of Joshua Bower of Leeds, and afterwards of the Burradon and Coxlodge Coal Company (which was succeeded in recent years by the Hazlerigg and Burradon Coal Co. Ltd.). Gosforth colliery passed to John Bowes and Partners, who had become the owners of Killingworth Colliery two years earlier. Brandling died on August 26, 1853, in his 82nd year. He was the last of the "Brandlings of Gosforth".

Bigges Main colliery was flooded and closed in 1857, and its wagonway became disused down to the junction with the Coxlodge wagonway. The latter continued to convey the Coxlodge and Gosforth coals until 1885, when the line from Gosforth to the Tyne at Wallsend was finally abandoned. The Burradon and Coxlodge Coal Co. then built a new Fawdon railway from a junction with the N.E.R. near Gosforth east junction to Hazlerigg, which was completed in 1892. This used the portion of the old line between the North Eastern Railway (just north of South Gosforth station) and the old Jubilee pit of Coxlodge colliery. From the Jubilee pit an entirely new alignment was adopted, joining the route of the old Brunton and Shields Railway at East Brunton.

When the Tyneside Tramways and Tramroads Company was formed, by an act of August 9, 1901, to make a series of passenger street tramways, the scheme also included a $2\frac{3}{4}$-mile tramroad on its own track between Haddricks Mill Bridge (on the boundary line between Gosforth and Longbenton) and High Street West, Wallsend. Practically the

whole of this (from a point called Bridge Row, at the Gosforth end) was laid along the site of the disused Coxlodge wagonway, the land of which was purchased under the powers of the 1901 Act. It was opened as an electric passenger tramroad of 4ft. 8½in. gauge on October 18, 1902. By reason of bus competition, the tramway system was abandoned on April 6, 1930, including this tramroad section. The land of the tramroad was conveyed to the London and North Eastern Railway on December 11, 1935.

Victoria Tunnel

It seems convenient at this point to consider another underground colliery railway, which came into prominence in the recent war when it was converted to form an air-raid shelter. The Spital Tongues colliery, situated between Newcastle Town Moor and the Leazes, about half a mile from the town, was held under lease for the term of 31 years from March 25, 1835. The original proprietors were Porter and Latimer. A railway was formed in a tunnel constructed by these proprietors from the colliery to the Ouseburn, at the east end of Newcastle Quay, and the coals were readily conveyed by a fixed engine from the pit to the place of shipment. This underground wagonway was begun on June 27, 1839, and completed on January 8, 1842. It was opened formally by the Mayor of Newcastle on April 7, 1842. The completion is described as follows in *The Local Historian's Table Book*, Vol. 5, by M. A. Richardson (Newcastle, 1846):

> "1842 January 8: That immense undertaking, the Spital Tongues colliery tunnel, belonging to Messrs. Porter and Latimer was opened throughout the entire length, from the colliery to the river Tyne near the Glasshouse bridge. The extreme length of the tunnel is 2½ miles: total descent from the entrance at the colliery to the level of the spouts for shipping the coals, 222 feet. This line of railway is worked by a stationary engine, the loaded waggons (containing a chaldron each) taking after them the rope

to draw the empty waggons back. The power of the engine is 40-horse, and it will draw 32 empty waggons back; and should the trade require the quantity, three runs, or twelve keels, could be shipped in an hour." (The estimated power of the engine given above was found to be considerably overrated in practice.) "The gauge of the rails is 4 feet 8 inches. The waggons are of an improved form invented by W. E. Gillespie, the engineer who had the whole management of this stupendous work. The tunnel from end to end is arched with bricks, and has an inverted stone arch at bottom; its form is similar to that of the Thames tunnel. Dimensions inside, 7 feet 8 inches high, by 6 feet 3 inches wide. . . . It is a remarkable circumstance that the whole of the strata worked was composed of nothing but solid clay, neither rock nor any other impediment presenting itself. The tunnel commences at the surface, and its greatest depth is 85 feet; its course is south-east, and it passes beneath the Town-moor, the Barras-bridge, the bed of Pandon-dean, the Shieldfield, etc., on its way to the river, where coal spouts are erected for the loading of vessels."

After the original proprietors had contended with various difficulties for upwards of 20 years, the property fell into the hands of the Northumberland and Durham District Banking Company, and it was worked for some time on behalf of the bank by Edward Richardson. About two years after the stoppage of the bank, the liquidators offered the colliery for sale by auction on November 22, 1859. In the particulars of sale, it was stated that the railway tunnel was $1\frac{3}{4}$ miles long, and that it passed under certain parcels of ground, not belonging to the vendors, and for liberty of such passage, annual rents, amounting to £180, were payable.

The general inventory of standing plant and rolling stock on November 10, 1859, included a 70 h.p. high pressure double-hauling engine, with upright and horizontal cylinder, and drum, 14 ft. in diameter, with $1\frac{3}{4}$ miles of $2\frac{5}{8}$ in. wire rope attached; about four miles of malleable iron rails from colliery to staith, weighing 36 lb. a yard, and 52 one-chaldron wagons. There were also about 14,000 yd. of malleable iron rails (underground) weighing 12 lb. a yard.

The highest bid made at the sale was £6,000, against a reserve bid of the liquidators of £13,570. In January,

1860, the whole of the plant and machinery was offered for sale in lots by public auction.

From this time the tunnel lay derelict until early in 1939, when Mr. P. Parr, the Newcastle City Engineer, was considering various schemes for the provision of deep air-raid shelters. The old tunnel was cleaned out, provided with a series of entrances, and equipped as an excellent underground shelter.[28]

Heaton Wagonway

The next line eastward was the Heaton wagonway, which is deserving of a place in history as an early user of locomotives. This railway seems to have been a development of the Lawson Main wagonway, of which the history has not been traced fully. It is shown on the 1788 map from Walker Hill (Lawson Main), through Byker, to St. Anthony's. According to Nicholas Wood, it was laid (presumably relaid) by Thomas Barnes in 1797, as the first iron railway in the north of England. Stone sleepers were used instead of wooden sleepers, and both these and fish-bellied rails were novelties in the neighbourhood of Newcastle. Two undated drawings of the "Lawson Main Waggon Road", in the Boulton and Watt collection of papers at the Birmingham Library, show that the stone sleepers were not square blocks, but transverse slabs, laid like wooden sleepers, to a gauge of 4 ft. 3 in. The cast-iron rails were laid in chairs—the earliest known example. This relaying was probably undertaken in connection with the extension of the line to Heaton. Under an agreement of August 15, 1791, with Sir Matthew White Ridley, Messrs. George Johnson, William Row, and Robert Smith, undertook to sink three pits at Heaton and to build a wagonway. A tender for maintaining the Heaton wagonway and wagons, and also for ballasting, was made

[28] The work was fully described in a Paper by Redvers W. Grant presented to the Institution of Municipal Engineers in Newcastle, of which extracts were published in the Journal of that Institution dated August 18, 1942.

to the three lessees by Jas. and Rd. Forster on January 1, 1795. Casson shows the railway in 1801 extending to Heaton Main (probably the Middle pit), and by 1812 it had reached the High pit.

William Chapman's chain engine, which was patented on December 30, 1812, was tried on the Heaton wagonway in October, 1813, according to *Who Invented the Locomotive Engine?* (O. D. Hedley, 1858, page 9). Tomlinson states that the Heaton wagonway at that time ran in a south-easterly direction from the "High" or "E" pit, situated a little west of the present Byker and Heaton Cemetery, past the "Middle" or "C and D" pit to the "Engine" or "A and B" pit, the site of which is occupied by the N.E.R. sidings near the carriage-washing sheds at Heaton Junction. It then proceeded in a south-westerly direction across the North Shields Road—a few yards to the east of the Two-mile Houses—to the Lawson Main pit, from which point its course was first SE. and then S. to St. Anthony's Quay—a total distance of 3 miles 258 yd. The *Repertory of Arts, Manufactures and Agriculture* for 1818 (second series Vol. 33, p. 19) says that Chapman's chain patent has been "effectively proved under very disadvantageous circumstances on the wooden rail-way from Heaton Colliery to the River Tyne". This suggests that the early use of cast-iron rails was not developed at the time, possibly because the pioneer (Thomas Barnes) died at Walker in 1801, at the early age of 36.

The wagonway was relaid as an iron railway in 1821, for ordinary locomotive traction. John Birkinshaw said in a letter of November 23, 1824, that his wrought-iron rails had been laid at Heaton in 1821, and used by a locomotive, and William Losh, in a letter of November 3, 1821, referred to the successful use of cast-iron rails at Heaton, made under the Losh and Stephenson patent of 1816. The locomotive in use in 1821 was probably one of George Stephenson's.

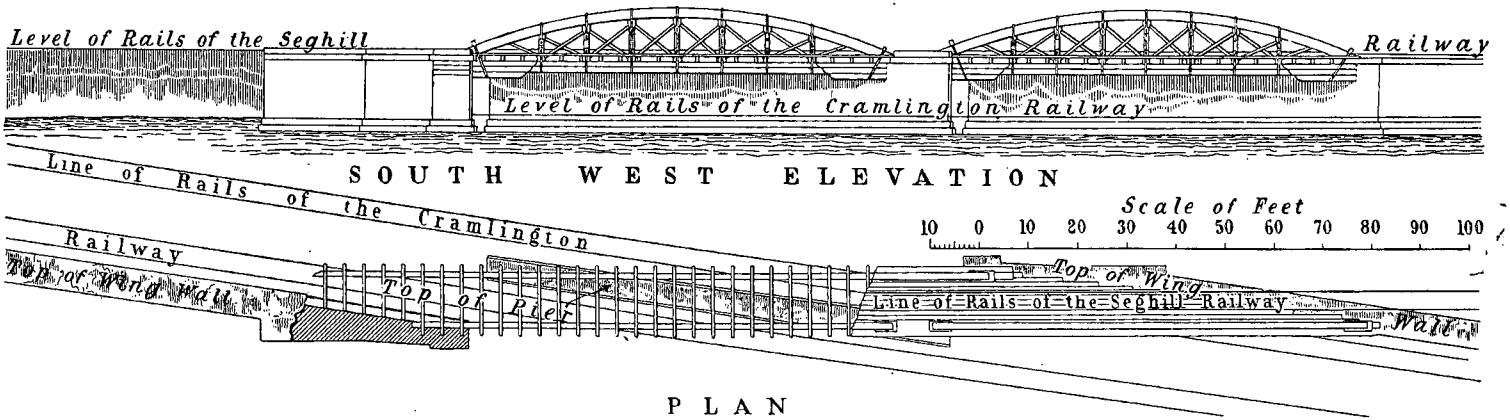
By the time Greenwood's map was published, on December 15, 1828, the Heaton Railway is shown with an

entirely new alignment from Heaton Middle pit, joining the Bigges Main and Coxlodge wagonway, and the Lawson Main railway has disappeared. The Lawson main colliery was closed about 1811 (certainly before a report of 1815), but its railway seems to have continued in use for some years for Heaton traffic. The new Heaton route is supported by the Nichols, Priestley and Walker map of January 1, 1830. It seems probable that this new alignment was adopted at the relaying in 1821, particularly as it was for use by a Stephenson engine, doubtless of the customary 4 ft. 8 in. gauge, and a link was made with a wagonway which we have seen already was virtually of that gauge. By 1850, the whole of the Heaton Railway had disappeared.

Willington and Killingworth Wagonways

The first section of this historically important group of wagonways was laid in 1762 from Willington Square to Willington Quay. The gauge was 4 ft. 8 in., a figure which the present writer has not encountered in earlier documents relating to wagonways anywhere, although the earlier Gosforth and Coxlodge group of lines used 4 ft. 7½ in., which was practically the same, and provided no difficulty with through-running. The facts that the Killingworth line was the training ground for George Stephenson, and that he built his first locomotive for it, are directly responsible for the adoption of the figure of 4 ft. 8½ in. (half an inch extra to improve clearances) throughout many parts of the world as the standard gauge for public railways. It was the early export trade in locomotives of Robert Stephenson and Co., of course, which carried this gauge so far afield.

In 1772 William Gibson of Westgate Street, Attorney-at-Law, and Town Clerk of Newcastle, Matthew Bell of Westgate and afterwards of Woolsington, and William Brown of Heddon and later of Longbenton, arranged to take a lease of the coal seams under the estate of Sir Ralph Milbank for 31 years from May 12, 1773. A few months later

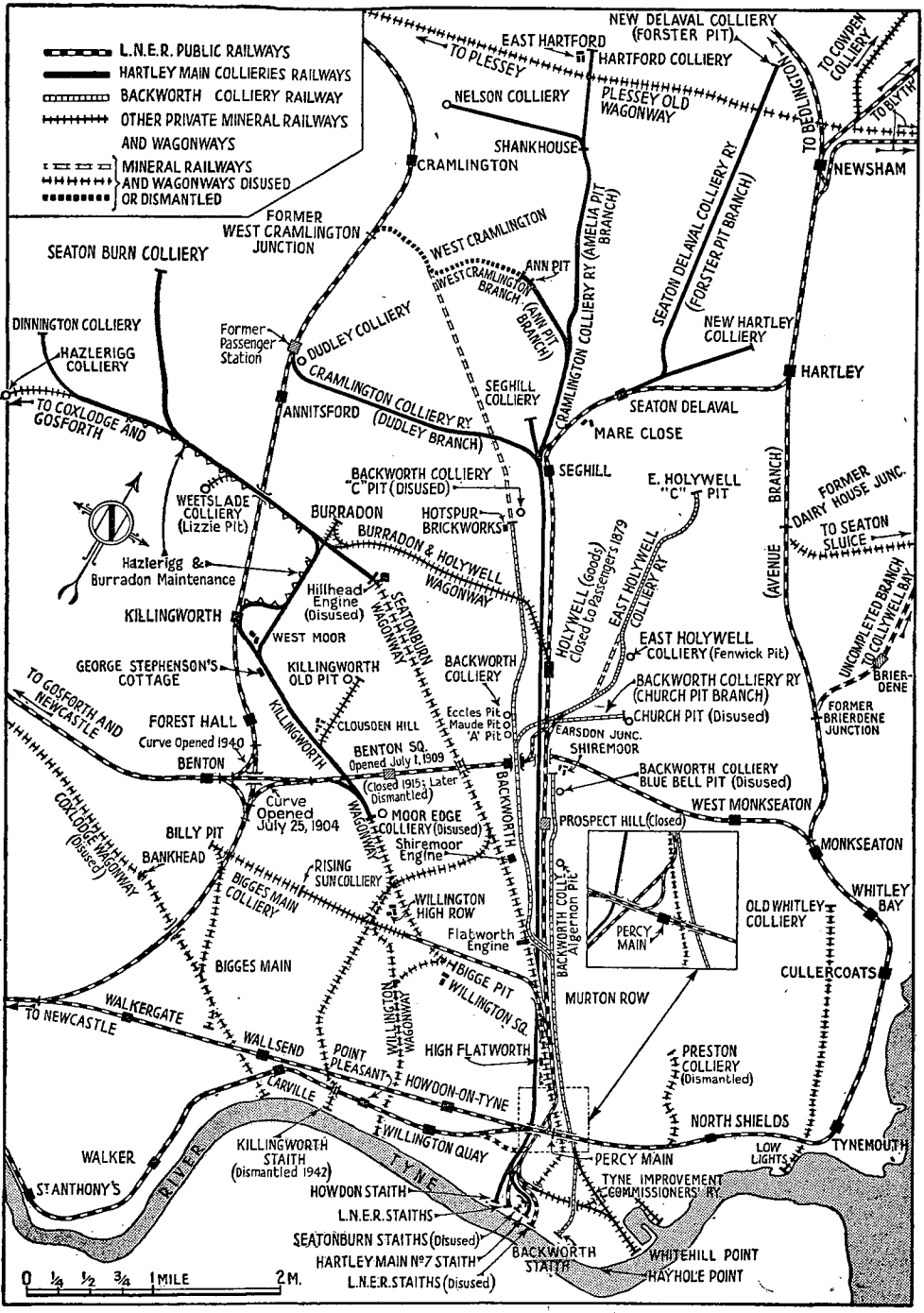


Plan and elevation of Seghill railway bridge across the Cramlington line south of Seghill Station.
Copied from a plate in *Railway Practice*, by S. C. Brees (second series, 1840).

they also took a lease dated November 5, of the Willington Farm, the Backwell Farm, and part of the Milbank estates for 30 years from old May Day, 1774. They sunk a shaft to the north-east of where Willington Square now stands, as this gave them easy access to the wagonway running to Willington Quay.

By the time Gibson's map of 1788 was published, there was a branch to Longbenton (2½ miles from the staiths). This was in the neighbourhood of Benton Square, and entirely distinct from the "Long Benton" estate of the 1749 plan, with its colliery near Gosforth. A similar position is recorded on Casson's map of 1801. In 1806 a branch was built to the Killingworth colliery which the "Grand Allies" began in 1802, and the 1812 map shows the whole line marked as Killingworth Railway. The award of December 5, 1810, already mentioned, has been cited as showing that the rails were then wood, but if this award did in fact refer to the Bigges Main wagonway, as suggested, it gives no clue to the material of rail on the Killingworth and Willington line. Nicholas Wood's remark about Stephenson's first locomotive being tried on a piece of road with the edge rail on July 27, 1814, suggests that the Killingworth wagonway was then partly wooden rails and partly cast-iron. When Stephenson and Wood began their resistance tests in October, 1818, the rails were Losh and Stephenson cast-iron edge rails 3 ft. 9½ in. long, with a flat bearing surface 2½ in. broad. John Birkinshaw's letter of November 23, 1824, stated that his wrought-iron rails were laid at Killingworth in 1820. The Nichols, Priestley and Walker map dated January 1, 1830, indicates a compact system, including a branch to Burradon, and another to a point about Billy pit (or William pit), but not actually meeting any portion of the Coxlodge wagonway system, either main line or branch. Burradon pit was sunk by the Grand Allies about 1820, and the wagonway was extended to that point from Killingworth at the same time.

In 1820 a new Willington wagonway was laid from Battle

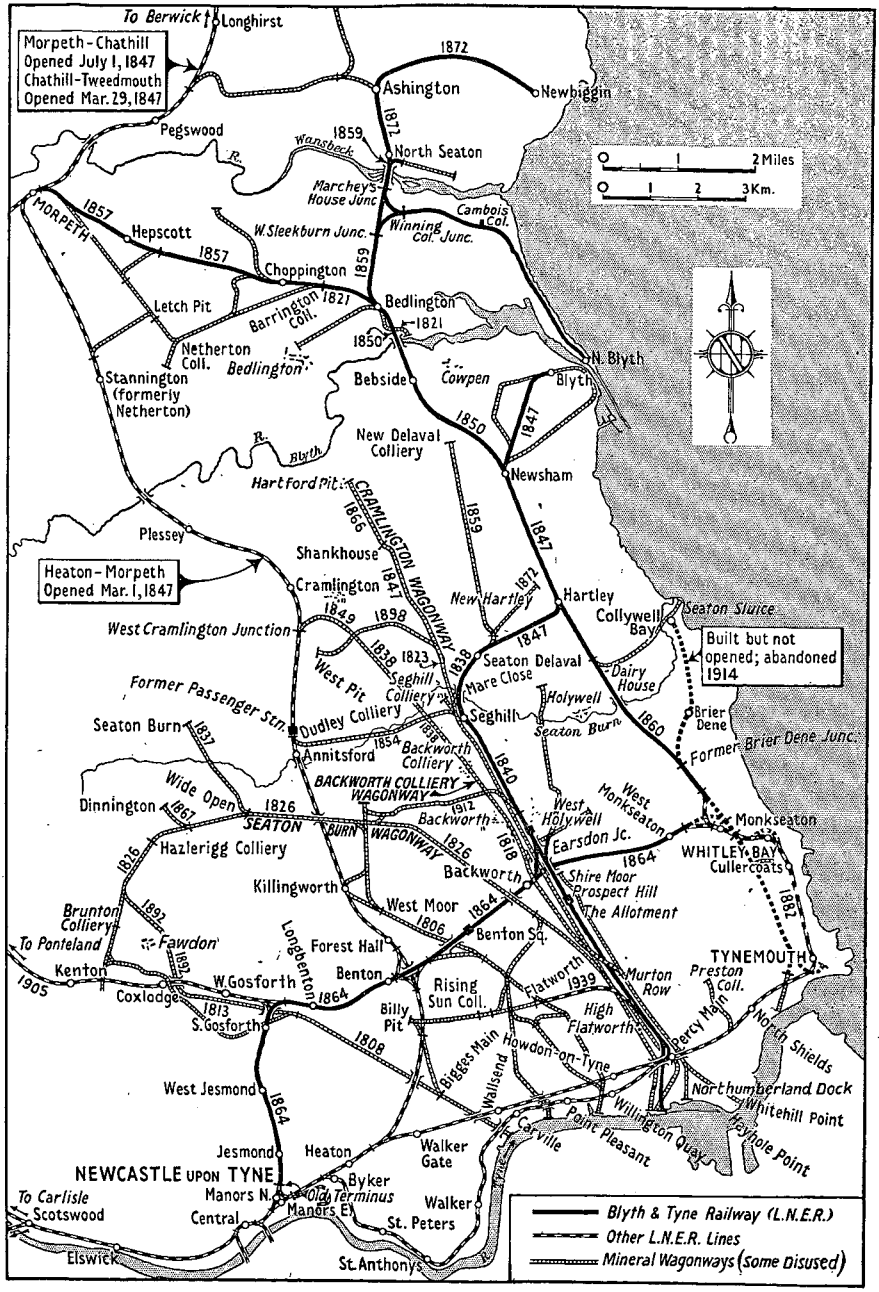


The mineral railway system based on Percy Main and Northumberland Dock, immediately before colliery and railway nationalization.

Hill to the Low Pit, crossing Willington dene by a timber bridge on stone pillars, and thence down what afterwards became Rosehill Road. This route was worked on the inclined plane system, and eventually superseded the 1762 line, and also the horses necessary for that route. The Willington stables were therefore converted into dwelling-houses. It appears that the owners of Killingworth colliery continued to use the old line until about 1830, when they made their own inclined plane from the Rising Sun farm to a bridge (Wallsend Viaduct) built over the Burn Closes. From the foot of this incline the line continued to new staiths at Wallsend. According to local tradition, this section was horse operated until 1850. The Killingworth and West Moor properties remained in the hands of the "Grand Allies" until 1850, when they were transferred to John Bowes and Partners, who held them until 1900.

In its later years under private ownership, the Killingworth wagonway was in the hands of the Seaton Burn Coal Co. Ltd. (incorporated on May 4, 1899). The line was single throughout with passing loops, built to conform to light railway standards. From Killingworth it fell gradually to the staiths, a distance of $3\frac{1}{2}$ miles, at 1 in 211, 1 in 64, and 1 in 44, all in favour of loaded trains. The line crossed the wide valley near Wallsend by means of the lofty viaduct already mentioned. The L.N.E.R. Tyneside electrified lines were crossed twice on the level, once near Benton and once near Wallsend; the line was controlled at these points from L.N.E.R. signal boxes. The exchange points with the railway company were at Killingworth and near Benton. The former point was used also by the Hazlerigg and Burradon Coal Company, and the latter by the Wallsend and Hebburn Coal Company. Both of these companies shared part of the Seaton Burn line from their respective collieries to the exchange points.

The Wallsend and Hebburn traffic originated at the Rising Sun colliery, which was opened in September, 1908. It secured its rail access by using a portion of the ancient



The development of the railways based on Percy Main.

Bigges Main (Billy pit) to Willington wagonway, linked by a curve to the Killingworth wagonway, and ran its traffic on to the North Eastern Railway at Killingworth Crossing, near Benton. This involved a considerable amount of back-shunting, and a substantial rail mileage between pit and staiths. In 1939 the L.N.E.R. built a new line from Willington to Murton Row, linking the wagonway with its former Blyth and Tyne line to Percy Main. This reduced the total haul from about 6 miles to 3 miles. The Seaton Burn Coal Company was absorbed by the Hartley Main Collieries Ltd. in April, 1938, and, under the reorganization which followed, it was decided to abandon the Killingworth wagonway south of the site of the disused Moor Edge colliery. This took place finally in 1942, and the Killingworth staith was dismantled in that year. The part still remaining in use is a portion of the 1806 line between Moor Edge and West Moor, which is almost certainly the section over which Stephenson's original locomotive trials took place.

Seaton Burn Wagonway

We now come to the first of the complex group of lines which reaches the Tyne in the vicinity of Percy Main. Although not the earliest of these, the most westerly was the Seaton Burn wagonway, and it is convenient to deal with it first, both on geographical grounds, and also because afterwards it became associated with the Killingworth Railway.

The origin of the Seaton Burn wagonway is to be found in the Brunton and Shields Railway, built in 1826 by Benjamin Thompson. It extended from Brunton coal pit, about 3½ miles north-west of Newcastle, to the river Tyne at Whitehill Point, a distance of some 9¾ miles. Rastrick's notebook in the library of the University of London mentioned this line under the date January 27, 1829. The gauge was 3 ft. 6 in. Fordyce says that "the quantity of

land damaged by the wagonway was 75 A. 1 R. 27 P." In connection with his work on the Fawdon-Scotswood line, Thompson (who was one of the partners in the Ouston colliery) had demonstrated that it was possible to convey wagons over undulating country through the agency of fixed engines at a rate of 7 m.p.h. This system was put into practice on five miles of the Brunton and Shields Railway, and the wagons when in motion along the five planes worked by the fixed engines sometimes attained a speed of upwards of 10 m.p.h., or, taking into account the stoppages for changing ropes, etc., nearly 6 m.p.h. The results obtained on this line so favourably impressed Messrs. Walker and Rastrick, who had been deputed to report on the best system of traction for the Liverpool and Manchester Railway, that they recommended the stationary reciprocating system on the ground of economy, despatch, safety and convenience.

In Stephenson and Locke's "Observations on the Comparative Merits of Locomotive and Fixed Engines as applied to Railways" (1829), issued in reply to Walker and Rastrick's report, Thompson's system is described thus:

"The plan consists in placing Steam Engines at intervals of one or one and a half miles along the whole line of Railway, and having ropes running on rollers, placed between the rails, to extend from one Engine to the other, by which the waggons are drawn forward. When a train of waggons leaves a station, it takes along with it another rope, technically called the '*tail-rope*', which serves to bring back the next train which is moving in the contrary direction; the rope which drew the first train then becomes the '*tail-rope*', and is drawn back by the former, which then becomes the '*head-rope*'. This is called the reciprocating system. . . .

"The Brunton and Shields Railway has five continuous planes worked by Fixed Engines, only one of which may be said to be on the reciprocating plan! for on three of the planes the loaded waggons run of themselves, and the rope is merely used to draw back the empty ones; and on the

other the full waggons are drawn up, and the empty ones run back with the rope: from which it appears, that on four of the planes it is only necessary to use one rope, the gravity of the waggons dispensing with the other."

A connection to the Brunton and Shields Railway was made from Fawdon colliery in 1826, and this enabled the Fawdon-Scotswood line to be abandoned, but the change involved the coals from this area in the lengthy and circuitous journey to the Tyne at Whitehill Point. Another early user of the line was the Wideopen colliery, where sinking began in April, 1825. Coals were drawn in May, 1827, and used the railway "to the Tyne near Percy Main estate". Fawdon and Wideopen were both working in 1844, but the former seems to have been abandoned soon after, as the railway is shown in 1850 as working only from Brunton colliery northwards, and the lines around Fawdon have disappeared. Fordyce in 1860 said that the wagons that had been used at the Fawdon and Wideopen collieries differed from those at other places in size and shape, each containing only half a chaldron, and being rectangular in form.[29] He added that Wideopen colliery had then been abandoned for some time as unprofitable. Brunton colliery also seems to have disappeared by this time, and the railway from Wideopen to Brunton fell into disuse.

Seaton Burn colliery was opened in 1837 by the Grand Allies (Lord Ravensworth and Partners), and a branch line to it was built. In common with Killingworth and West Moor, the Seaton Burn colliery was transferred in 1850 by the Grand Allies to John Bowes and Partners, then consisting of the three original partners (John Bowes, William Hutt, and Nicholas Wood) with the addition of Sir Charles Mark Palmer, who had become a partner in 1847. Fordyce said that Seaton Burn was then the only colliery in the trade using half-chaldron wagons along a light line of railway. At some period after 1860, not yet determined, the railway

[29] See Fordyce *Coal and Iron* for illustration of unusual rectangular wagon (p. 86).

from Seaton Burn to the Tyne was converted to a standard-gauge line, and used by normal colliery wagons. Also, a curve connecting this railway with the Killingworth Railway was built at or about the same time. It is probable that the change took place in 1867, when the opening of Dinnington colliery caused the line to be extended to that place. From Seaton Burn the branch is on a rising gradient of 1 in 380 to the main line at Wideopen, and this continues along the main line to the junctions at Burradon.

In 1892, as mentioned earlier, a new Fawdon Railway was built. It began at Gosforth, making a junction with the Blyth and Tyne section of the North Eastern Railway, and was mainly a reconstruction of the old Coxlodge wagonway thence to Coxlodge. Here it adopted a new course just to the east of the Jubilee pit, and of Fawdon itself, and joined the route of the old Brunton and Shields Railway near East Brunton. Thence it was substantially a reconstruction of that wagonway through to a junction near Dinnington, where it met the modernized Seaton Burn wagonway, as the line was now called. It is also shown on some maps as part of the Killingworth wagonway, which resulted doubtless from its reconstruction under the same owners. Like the main Killingworth line, it passed into the hands of the Seaton Burn Coal Company in 1900, and continued to be worked until the 1920s, when it gradually fell into disuse south of Hillhead engine, in favour of the Killingworth route to the Wallsend staiths. The Rising Sun colliery branch of the L.N.E.R., opened in 1939 and completed in 1942, uses the Seaton Burn wagonway bridge over the Hartley Main (Cramlington) line at Murton Row, and the wagonway is cut away at each side.

A link between the Seaton Burn wagonway at Burradon and the Blyth and Tyne Railway (by now part of the North Eastern Railway) at Holywell was built in 1911-12 by the Hazlerigg and Burradon Coal Co. Ltd. This is called the Burradon and Holywell wagonway. It gave its owners direct access to the main railway system for approach to

Northumberland Dock. By an agreement of (about) 1944, the Burradon and Holywell line was used also by the Hartley Main Collieries Limited, which had acquired the Seaton Burn properties, as already noted.

The Backworth to Percy Main Group of Lines (map p. 185)

The very important group of lines paralleling one another between Backworth and the river developed as a result of keen competition. John Gibson's plan of 1788 is not always easy to interpret, and all that can be said is that it shows a railway even at that early date from "High Flatworth" (on the edge of Shire Moor) to a staith at Hayhole Point, 3 miles. By the time Casson published his plan of collieries and wagonways in March, 1801, it had been extended to Murton Main (and possibly Shiremoor), and, when the 1812 map was prepared, there is clearly indicated a line inland from Hayhole Point which bifurcated to Murton Main in the east and Shiremoor in the west. This wooden wagonway was doubtless the basis of the later north-south railways at Percy Main. A local line called the Percy Main wagonway was opened on September 3, 1802, from Percy Main colliery to staiths at Howdon, but this seems to have disappeared in the development of Northumberland Dock. In May, 1810, John Buddle was negotiating with the Butterley Ironworks for 1,400 yd. of cast-iron rails for the owners of Backworth colliery, partly to replace a wooden way then in use, but no particular pit or line is indicated.

On September 10, 1818, a ship was loaded on the Tyne with coals drawn from the Backworth "A" pit, and this is believed to have been the first occasion when Backworth coals were shipped on the Tyne. Presumably they were led over the line which is now the main section of the Backworth Colliery Railway, and this is the nearest indication at present traced to the date when it was built. John Buddle's diary says that the Backworth to Allotment section was converted to rope haulage in December, 1821; the Allotment to Percy

Main section in 1823; and the line throughout in August, 1827.

Fordyce, in *Coal and Iron*, says that, in the years 1822 and 1823, a large amount of capital was sunk in Seghill colliery, and in the adjoining one of Cramlington, and from this period dates the Cramlington Colliery Railway from Cramlington (now Ann pit) to Murton Row on the Backworth Railway, over which running powers were exercised thence to Percy Main, where the Cramlington Railway separated to reach its own staith. From 1826, the owners of Seghill colliery communicated with the Tyne over the Cramlington Railway, and thus also over part of the Backworth Railway. In addition, the West Cramlington colliery was begun in 1837, and worked in conjunction with Backworth. The Backworth Railway was extended northward about 1838 to West Cramlington, where various shafts were sunk between 1838 and 1849. West Cramlington junction with the Newcastle and Berwick Railway was laid in about 1849. Early in 1839, the Cramlington Coal Company formed its own line from Murton Row to Percy Main, to avoid using any portion of the Backworth Railway, and shortly afterwards the proprietors of Seghill colliery decided upon a similar step.

The Seghill Railway

A few months before the opening (on June 18, 1839) of the Newcastle and North Shields Railway from Newcastle (Carliol Square) to North Shields, Robert Nicholson, the engineer of that railway, made a survey for a private mineral line from Seghill to Howdon on behalf of the Seghill colliery owners. Having entered into wayleave agreements for an independent railway from Seghill to the Tyne, they advertised in the *Gateshead Observer* of April 23, 1839, for tenders for the cuttings and embankments, and in June, the works were reported to be "in active progress". The Seghill Railway was opened for mineral traffic on June 1, 1840.

Proceeding in a south-westerly direction for half a mile, past the site of the present Seghill Station, it crossed obliquely the old line of the Cramlington Coal Company by a low timber bridge[30] of two laminated arches each 81 ft. 6 in. in span, and ran side by side with the earlier line as far as Murton Row. At this point it diverged from the Cramlington and approached the Backworth Railway, which had curved round to the east, and the two lines went down the hillside together. Near the Newcastle and North Shields road the Seghill Railway branched off to the south-west and, crossing the Brunton and Shields Railway, followed for a quarter of a mile the course of the old line which the Cramlington Coal Company had abandoned in 1839. Rejoining the Cramlington Railway near Low Flatworth, it went down with it to the staiths at Hayhole—now Northumberland Dock. From Seghill to Prospect Hill there were rising gradients of 1 in 228, 1 in 127, 1 in 69, and 1 in 61.5, and from Prospect Hill to the Tyne a series of falling gradients, the steepest of which were 1 in 63, 1 in 69, 1 in 55, 1 in 70, 1 in 25, and 1 in 31.

The line was worked principally by stationary engines, one at Prospect Hill, near the Allotment, hauling up the loaded wagons from Holywell, and the empty wagons from the Newcastle and North Shields roads, the other at Percy Main, close to the south side of this road, hauling the empty wagons from the staiths. From Prospect Hill to Percy Main and from Percy Main to the staiths the loaded wagons ran by gravity, unwinding from the drum of each engine a tail rope which was to bring back the empty ones, and the latter, when running by gravity to Holywell, drew out a rope for the use of the loaded wagons at the foot of the bank. The remainder of the line from Seghill to Holywell was worked by locomotives; those used at first were the *Samson* and the *John*, both built by Timothy Hackworth.

Another private line, $1\frac{1}{4}$ miles long, a portion of which afterwards formed, like the Seghill Railway, a section of

[30] Illustrated by S. S. Brees in *Railway Practice* (Second series, 1840).

the Blyth and Tyne Railway, was laid in 1838 by the Seaton Delaval Coal Company from the newly-sunk colliery at Seaton Delaval to the Cramlington Railway at Mare Close.

The Seghill Railway was opened for passenger traffic on August 28, 1841, and charged very modest third-class fares, the rate being slightly over ½d. a mile, like that on the Newcastle and North Shields Railway. Nevertheless, thus far its primary object was to convey coal to the Tyne, but developments of the next few months were to result in considerable extensions and the enlargement of the scope of the undertaking.

In 1843 the only outlets for a large portion of the steam coal district of Northumberland were the small private harbours of Blyth and Seaton Sluice. At Blyth the depth of water was not more than 10 or 12 ft. in neap tides, and 12 or 14 ft. in spring tides, so that only small ships could go there, and even they had to take in a portion of their cargoes from keels at sea. As copper-bottomed ships would not enter the harbour, the foreign trade was much restricted. The Bedlington Coal Company had just adopted a novel method of shipping its coals in the Tyne. Loaded chaldron wagons (40 in number) were conveyed by an iron twin-screw steamer called the *Bedlington*—specially built for the purpose in 1842—from the staiths on the north side of the river Blyth near Mount Pleasant to Shields Harbour and there discharged into colliers by means of the steam derricks with which the vessel was provided. Some account of this enterprise, which lasted until 1851, was given in *The Railway Magazine* for January, 1937, page 67.

The difficulty of competing with collieries more favourably situated made the coalowners of the Bedlington district desirous of having access to the Tyne by railway. A line from Bedlington to Seghill was surveyed by Benjamin Thompson in 1843 for William Woods of Newcastle, who proposed to construct it as a private venture. Another line was the subject of a report by Robert Nicholson to John Jobling and Partners, the lessees of Cowpen and Hartley

collieries. Jobling's scheme was to ship the coals from the five collieries of Cowpen, Bedlington, Netherton, Bedlington Glebe, and Hartley at the Low Lights, North Shields. The line proposed ran direct south from the Blyth to the Tyne, coinciding in part of its course with the Whitley wagonway, of which brief details are given later.

The Newcastle and North Shields Railway Company worked the passenger and goods traffic on the Seghill Railway from June 25, 1844, having in view the extension of this line to Blyth, but in November of the same year George Hudson, "The Railway King", made a provisional agreement with the N. and N.S.R. to merge that undertaking with his own embryo Newcastle and Berwick Railway Company, and when that company received its act of incorporation, on July 31, 1845, the arrangement was confirmed. In the changed circumstances the Seghill Railway and the projected extensions assumed an independent importance.

The Blyth and Tyne Railway

In July, 1845, Jobling and Partners decided to construct a part of the proposed railway linking the rivers Blyth and Tyne, and, by forming a junction with the Seaton Delaval Railway and arranging for the connection of that railway with the Seghill Railway, secure a provisional route to the Tyne. The works of the Blyth and Tyne Junction Railway, as it was called, were let in August, 1845, and the *Tyne Mercury* of October 15, 1845, stated that they were within four months of completion. The line was not opened for passenger traffic until March 3, 1847, on which date the whole $4\frac{1}{2}$ miles between Seghill and Blyth began to cater for passengers.

Three years later Bedlington was connected with the growing system by the opening, on June 12, 1850, for mineral traffic, and on August 1 for passenger traffic, of a private line of railway from Bedlington colliery to Newsham ($2\frac{3}{4}$ miles) by the Bedlington Coal Company. This virtual

extension of the Blyth and Tyne Railway was carried across the river Blyth by a picturesque timber viaduct 80 ft. in height and 770 ft. in length, designed by Robert Nicholson, according to the *Newcastle Journal* of June 15, 1850. At this time, Netherton colliery was linked by its own wagonways with Bedlington, and also with the York, Newcastle and Berwick (afterwards N.E.R.) main line. In addition, contact was made at Bedlington with the famous pioneer wrought-iron railway of the Bedlington Iron Company, the first to use John Birkinshaw's patent rails of wedge form. This railway was 3 miles long, and was built early in 1821, probably to George Stephenson's survey.

At this point it is useful to notice what some of the other wagonways in the neighbourhood were doing. The West Cramlington shafts were sunk between 1838 and 1849, and the coal therefrom was first led to Howdon Staiths down an extension of the Backworth Railway which was built in 1838 to West Cramlington from Backworth, *via* Seghill village (not the colliery, which was served by the separate Seghill Railway, afterwards the Blyth and Tyne Railway). The Newcastle and Berwick Railway had been opened from Heaton (Newcastle) to Morpeth on March 1, 1847, and by 1849 the Backworth Railway had effected a junction with it at West Cramlington. Shortly afterwards this was used to convey the coals from Netherton (*via* the York, Newcastle and Berwick Railway and the West Cramlington wagonway) instead of *via* the Blyth and Tyne Railway with its heavy wayleaves.

In 1847 the Cramlington Railway was extended to the new pit at Shankhouse, and in 1866 to Hartford. The branch of the same railway from Seghill to Dudley colliery was built in 1854. The Seaton Delaval Coal Company in 1859 built a branch from the Blyth and Tyne Railway to New Delaval colliery, Forster pit, which was sunk at that time. The further branch to Hartley followed in 1872, when the Hastings pit was sunk.

Meanwhile, the continued risk of a competitive line from

the collieries of the Blyth district to North Shields, together with the refusal of the Board of Inland Revenue to concede to a private railway an exemption of duty on passengers conveyed under 1d. a mile as allowed to public companies, led the lessees of the various lines forming the Blyth and Tyne Railway to apply for Parliamentary powers of incorporation. During the year 1851 they cut through Prospect Hill, in order to adapt the gradients to locomotive power; rebuilt the bridges; erected additional spouts on Cowpen Quay; and generally improved the line, bringing the total capital expenditure up to about £130,000. The Act received the Royal Assent on June 30, 1852, as 15 and 16 Vic., cap. 122, and the authorized capital was £150,000. The line was then stated to total 13 miles, consisting of the main line from Blyth to the Hayhole on the Tyne (12 miles), a short branch to the York, Newcastle and Berwick Railway at Percy Main (the connection with the former Newcastle and North Shields Railway), and several short branches to shipping places on the Tyne.

The Blyth and Tyne Railway Company found itself committed to a policy of extension even before the line came into its hands on January 1, 1853. A rival company having resuscitated the scheme of 1848 for a dock at the Low Lights, North Shields, now proposed to make a railway, under Parliamentary authority, from Morpeth direct to North Shields, with branches to Ashington and Seaton Sluice. In self-defence the Blyth and Tyne Railway deposited plans for lines occupying part of the same ground, and the Parliamentary struggle which ensued was severe. The promoters of the Tynemouth Docks and Morpeth and Shields Direct Railway directed their attack chiefly against the old system of wayleaves which pressed so heavily on the lessees of the collieries north of the Blyth. The Blyth and Tyne Railway was thus placed in the position of having to unite with the landowners in fighting for a system which had already driven the Netherton coals away from its line to the York, Newcastle and Berwick and the West Cramlington lines. In fact,

the first shipment of Netherton coals in Sunderland Dock, nearly 30 miles from the colliery, was made on November 12, 1853, and this practice was adopted extensively. The support of the Blyth and Tyne received its reward in the concession by the landowners of modified terms of wayleave. "It was only by the landowners granting a lease for so long a period as 1,000 years, and by reducing the terms to the extent of about 33 per cent," wrote Robert Nicholson, the company's engineer, in October, 1853, "that Parliament was induced to perpetuate the principle and allow the owners to retain their wayleave."

Opposed by the Blyth and Tyne Railway and the landowners on the one hand, and by the River Tyne Commissioners, who had just let the contract for a dock of their own at Howdon, on the other, the promoters of the new dock and railway scheme failed to establish their case and their Bill was thrown out by a committee of the House of Commons. The powers applied for by the Blyth and Tyne Railway were obtained on August 4, 1853. These enabled the company to build a branch from Newsham to Morpeth, and part of a branch to Tynemouth (from New Hartley to Dairy House near Seaton Delaval). From Newsham to Bedlington the former branch followed the 1850 route of the Bedlington Coal Company to Bedlington, and thence to Choppington the 1821 route built by George Stephenson. The section between Hartley and Dairy House was part of the Hartley Colliery Railway to Seaton Sluice (then also called Hartley Harbour). The intention of the company was to buy some existing private lines and continue one of them to Morpeth. The company was pledged to the landowners to complete the railway to Tynemouth and, in the next year (1854) obtained power to make this extension, as well as a branch from Bedlington to Longhirst, thus safeguarding the district from invasion by a newcomer.

In 1855, the Blyth and Tyne Railway was still a wagonway carrying a few passengers in low-roofed springless carriages locally called "bumler boxes", but under the spur

of competition, the directors adopted a policy of improvement and proceeded to construct their authorized extensions. They cut down Prospect Hill again, doubled six miles of railway, built additional shipping staiths in the Tyne, bought two short colliery lines which formed portions of their main line between Seaton Delaval and Hartley and between Bedlington and Newsham, made a branch line to Morpeth, and took the preliminary steps towards extending their line to Whitley and Tynemouth. The inclusion of their coal-shipping staiths in the Northumberland Dock (which was opened on October 22, 1857) gave additional value to their railway as an outlet for the mineral produce of the Northumberland steam-coal district. On October 1, 1857, the Morpeth branch was opened for mineral traffic, and on April 1, 1858, for goods and passenger traffic. This branch seems to have been used before the formal opening, for it was completed on May 25, 1857 (when the workmen had their customary celebration), and the first cargo of coals from Hepscott colliery was shipped in the Hayhole Dock on June 1.

The Whitley Wagonway

The Blyth and Tyne line between Dairy House and Tynemouth was opened on October 31, 1860. The station was alongside the Master Mariners' Asylum in North Shields, but was called Tynemouth from 1860 to 1864, when it was renamed North Shields on the opening of the branch (on June 27, 1864) to a point nearer the mouth of the river. Between Whitleyhill (Monkseaton) and North Shields, the Blyth and Tyne Railway used the abandoned course of the old Whitley wagonway, mentioned briefly above. This line had been built in 1811, by Messrs. Clark and Taylor, the proprietors of Whitley colliery, and extended from the pit at Whitley, sunk in the summer of that year, to the Low Lights coal staith at North Shields. The old staith was taken down in 1850, so that the wagonway became abandoned either then or previously.

A Bill to enable the Blyth and Tyne Railway to extend its line to Newcastle and to make a number of other lines, namely, from Hotspur Place (Shiremoor) to Monkseaton, from South Gosforth to Lough Bridge near Butterlaw, from Seghill to the Seaton Burn wagonway, from Bothal Demesne to Newbiggin, and from the company's existing line at Tynemouth to proposed docks at the Low Lights, was passed by Parliament on May 1, 1861, and laid the foundation for the conversion of a series of mineral wagonways into an important public railway. The extension from Hotspur Place (near Backworth) to Newcastle, in one direction, and to Monkseaton in the other, was formally opened on June 22, 1864; the public opening took place on the 27th of that month. The last opening of the Blyth and Tyne Railway during its independent days was the 3½-mile Newbiggin extension from North Seaton, which was brought into service on March 1, 1872. This also absorbed the Bedlington to North Seaton portion of a single-line branch from the Blyth and Tyne that had been opened in November, 1859, by the proprietors of North Seaton colliery. This branch crossed the Sleek Burn and the Wansbeck on viaducts. The Bedlington to North Seaton section was doubled during the course of the work on the Newbiggin extension, but the new portion was laid with only one line of rails.

Shortly after the Newbiggin opening, the North Eastern Railway made overtures for the purchase of the Blyth and Tyne system, and the directors of the latter were then disposed to sell, but, in view of their excellent dividend record, stood out for a good price. Towards the end of January, 1874, terms of amalgamation were settled, the North Eastern Railway Company agreeing to guarantee a dividend of 10 per cent. on the Blyth and Tyne ordinary stock (then £315,000). On August 7, 1874, the act legalizing the arrangement, and vesting the Blyth and Tyne Railway in the N.E.R. system, received the Royal Assent, and the energetic and successful B. and T. passed from the subject of this paper, as it ceased to be primarily a colliery wagonway.

The Backworth and Cramlington Lines Again

The remaining wagonways based on Percy Main continued in the private hands of the colliery companies until the establishment of the National Coal Board on January 1, 1947. In 1898, the Cramlington lessees acquired the adjacent West Cramlington colliery, and built a connecting railway from Cramlington (Ann Pit) to West Cramlington. The old line from West Cramlington to Backworth thereupon became disused, as well as West Cramlington junction with the North Eastern Railway main line.

The main Backworth colliery line runs due south from a point near Seghill to the staiths on the Tyne at Northumberland Dock, a distance of about 6 miles. It is single throughout. From the northern end, the first $2\frac{1}{4}$ miles have a rising gradient of 1 in 120 until Backworth is reached. Thence a descent is made to the staiths, a distance of some 4 miles, with gradients of 1 in 218, 1 in 80, and 1 in 66, all in favour of loaded trains. The important roads are crossed, and both are controlled from the crossing-keeper's hut by two-aspect colour-light signals. Two crossings are made of the Tyneside electrified lines, the first by a bridge over Backworth Station, and the second under a bridge at Percy Main Station. Between these two stations, both the Hartley Main (Cramlington) and the British Railways Seghill lines are crossed by bridges, adjacent to Flatworth engine.

Backworth Collieries Limited was incorporated as a private company on June 21, 1912, and became a public company on June 2, 1932. It acquired the undertaking of the East Holywell Co. Ltd. in 1932, including the East Holywell wagonway, which branched off from the Church pit branch of the Backworth wagonway at Earsdon Junction.

The Cramlington Coal Co. Ltd., which was incorporated as a limited company on June 7, 1901, was amalgamated in 1929 with the Seaton Delaval Coal Co. Ltd. (incorporated on August 18, 1897). Hartley Main Collieries Limited was

incorporated on May 16, 1929, to effect the merger by acquiring the two properties, and each constituent contributed substantial wagonways. The larger was the Cramlington wagonway, totalling more than 16 miles. The Seaton Delaval wagonway, about 3½ miles in all, had no direct connection with the Cramlington line, excepting over the track of the former L.N.E.R. between Seaton Delaval and Seghill.

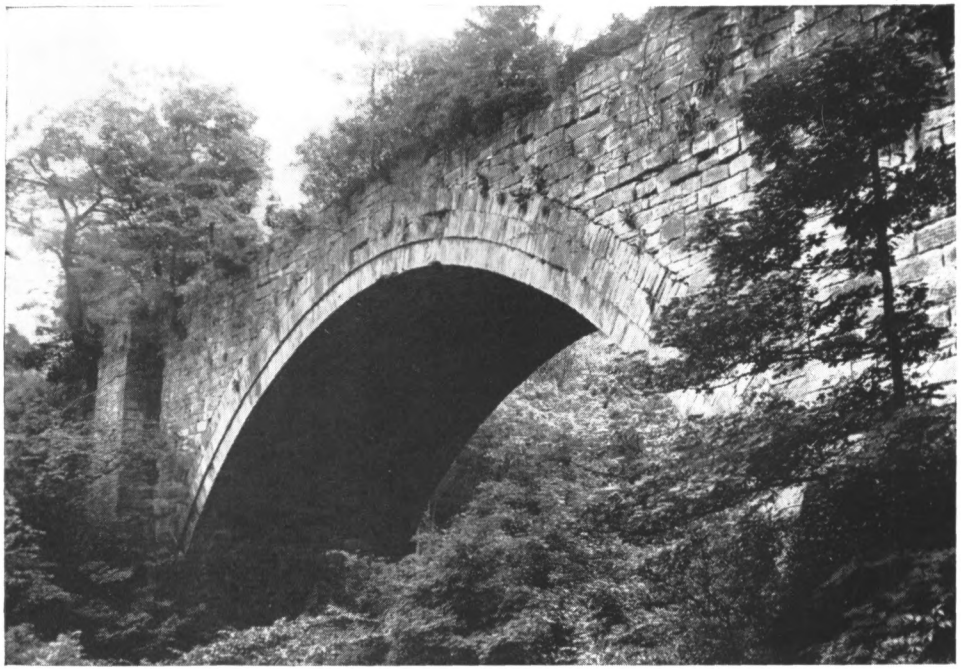
The main Cramlington line extends from Seghill to the staiths, a distance of a little over 6 miles, but the terminus at Hartford colliery is nearly 9 miles from the river. From Seghill, the main line rises for some 2½ miles, to the summit at Prospect Hill, on gradients of 1 in 228, 1 in 127, 1 in 69, and 1 in 61. It then descends to the Tyne staiths for about 3½ miles at 1 in 63, 1 in 69, 1 in 55, 1 in 70, 1 in 25, and 1 in 31. The railway is laid with bull-head rails, keyed in chairs, but of light railway standards, by reason of gradients and curvature, and the weight limit imposed because of possible mining subsidences. Loaded trains vary between 20 and 30 ten-ton wagons, and travel at walking pace on the steepest gradients. A considerable portion is double track, and, as seen from the accompanying maps, the route parallels the British Railways line. In fact, at several places there are four-track level crossings controlled by British Railways signal boxes, and immediately east of Backworth Station the same bridge carries both the Cramlington and the British Railways Seghill lines over the electric railway to Monkseaton. There are cross-overs to enable either railway to use the tracks of the other in emergency. On these parallel railways, two trains may often be seen running neck-and-neck on the journey to the staiths, and providing the amusing spectacle of "competition" between the respective nationalized undertakings of British Railways and the National Coal Board. There are exchange connections between the Cramlington system and British Railways at Seaton Delaval, Seghill, and Annitsford.

With the acquisition on April 1, 1938, of the Seaton Burn Coal Company, the Hartley Main collieries became pos-

sessed of the further important wagonway system, including the Killingworth Railway, which we have noticed already.

Unfortunately, it has proved difficult to trace even the main points of the story, because of the destruction of records. At the time of the Cramlington and Seaton Delaval amalgamation in 1929, the Cramlington colliery offices were abandoned, and the staff housed at Seaton Delaval. Later, the combined staff was moved to new offices at Cramlington. During these changes, a mass of original records and documents, not immediately required for use, was left in the old Cramlington offices, and ultimately bundled and sent for salvage in the earlier years of the recent war, when no member of the staff could be spared to select what should have been retained.

The researches embodied in this paper have been conducted intermittently during 25 years, and thanks are due to many persons for access to documents and for help in many ways. Some are dead, and others are now retired or are occupying positions in different spheres from those in which they gave their help. The railway and colliery companies are now nationalized. It would be invidious, therefore, to make particular mention of assistance, but the writer is none the less grateful for his enjoyment of the ready help that is characteristic of Tyneside.



Modern view of the Causey arch, County Durham, which was built about 1727 to carry a double-track wagonway of 4-ft. gauge. It is probably the oldest surviving railway bridge in the world, and was scheduled in 1935 as an Ancient Monument of national importance.

Propelling a rail vehicle by horse in County Durham. This unusual view, showing a railway coal wagon with horse in rear, is reproduced from the illustrated title to the map of the County Palatine of Durham, surveyed by Captain Armstrong and engraved by Thomas Jeffreys, 1768. It is suggested that the apparent " shaft " is a brake lever.

Mineral train, headed by ex-North Eastern Railway 0-6-2 tank engine, on the Tanfield Wagonway, now a branch of British Railways.