LIFE

OF

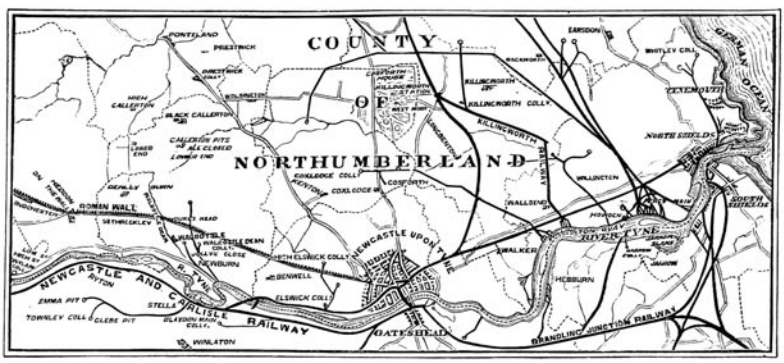
GEORGE STEPHENSON, &c.

CHAPTER I.

Newcastle and the Great Northern Coal-Field.

In no quarter of England have greater changes been wrought by the successive advances made in the practical science of engineering than in the extensive colliery districts of the North, of which Newcastle-upon-Tyne is the centre and the capital.

In ancient times the Romans planted a colony at Newcastle, bridging the Tyne by the Pons Ælii near the site of the present low-level bridge shown in the prefixed engraving, and erecting a strong fortification above it on the high ground now occupied by the Central Railway Station. North and north-west lay a wild and barren country, abounding in moors, mountains, and morasses, but occupied to a certain extent by fierce and barbarous tribes of Picts and Caledonians. To defend the young colony against the ravages of these dangerous neighbours, a strong wall was built by the Romans, extending from Wallsend on the north bank of the Tyne, a few miles below Newcastle, across the country to Burgh-upon-Sands on the shores of the Solway Frith. The remains of the wall are still to be traced in the less populous hill-districts of Northumberland. In the neighbourhood of Newcastle they have been gradually effaced by the works of succeeding



MAP OF NEWCASTLE DISTRICT.

generations, though the "Wallsend" coal consumed in our household fires still serves to remind us of the great Roman work.

A long period of obscurity followed the withdrawal of these colonists, during which Northumbria became planted by an entirely new race, principally Saxons from North Germany and Norsemen from Scandinavia, whose Eorls or Earls made Newcastle their principal seat. Then came the Normans, from whose *New* Castle, built some eight hundred years since, the town derived its present name. The keep of this venerable structure, black with age and smoke, still stands entire at the northern end of the noble high-level bridge — the utilitarian work of modern times thus confronting the warlike relic of the older civilisation.

The nearness of Newcastle to the Scotch Border was a great hindrance to its security and progress in the middle ages of English history. Indeed, the district between it and Berwick continued to be ravaged by mosstroopers long after the union of the Crowns. The gentry lived in their strong Peel castles; even the larger farm-houses were fortified; and bloodhounds were trained for the purpose of tracking the cattle-reivers to their retreats in the hills. The Judges of Assize rode from Carlisle to Newcastle guarded by an

escort armed to the teeth. A tribute called "dagger and protection money" was annually paid by the Sheriff of Newcastle for the purpose of providing daggers and other weapons for the escort; and, though the need of such protection has long since ceased, the tribute continues to be paid in broad gold pieces of the time of Charles the First.

Until about the middle of last century the roads across Northumberland were little better than horse-tracks, and not many years since the primitive agricultural cart with solid wooden wheels was almost as common in the western parts of the county as it is in Spain now. The track of the old Roman road continued to be the most practicable route between Newcastle and Carlisle, the traffic between the two towns having been carried along it upon pack-horses until a comparatively recent period. When Marshal Wade attempted to march westward in 1745, to intercept the Highland rebels on their way south, he was completely baffled by the state of the roads, which were impracticable for wheeled vehicles.[1] After the rebellion had been put down, the Marshal proceeded to construct a military road to connect Newcastle with Carlisle. He closely followed the line of the Roman wall for thirty miles west of Newcastle, and overthrew what remained of that work for the purpose of obtaining materials for his new "agger."

Since that time great changes have taken place on the Tyne. When wood for firing became scarce and dear, and the forests of the South of England were found inadequate to supply the increasing demand for fuel, attention was turned to the rich stores of coal lying underground in the neighbourhood of Newcastle and Durham. It then became an article of increasing export, and "seacoal" fires gradually supplanted those

[1] See 'Lives of the Engineers,' vol. i., Memoir of John Metcalf.

of wood. Hence an old writer described Newcastle as "the Eye of the North, and the Hearth that warmeth the South parts of this kingdom with Fire." Fuel has become the staple trade of the district, increasing from year to year, until at length the coal raised from these northern mines amounts to the extraordinary quantity of upwards of sixteen millions of tons a year, of which not less than nine millions of tons are annually conveyed away by sea.

Newcastle has in the mean time spread in all directions far beyond its ancient boundaries. From a walled mediæval town of monks and merchants, it has been converted into a busy centre of commerce and manufactures inhabited by nearly a hundred thousand people. It is no longer a Border fortress—a "shield and defence against the invasions and frequent insults of the Scots," as described in ancient charters—but a busy centre of peaceful industry, and the outlet for a vast amount of steam-power, which is exported in the form of coal to all parts of the world.

Newcastle is in many respects a town of singular and curious interest, especially in its older parts, which are full of crooked lanes and narrow streets, wynds, and chares,[1] formed by tall, antique houses, rising tier above tier along the steep northern bank of the Tyne, as the similarly precipitous streets of Gateshead crowd the opposite shore. A dense cloud of smoke constantly hangs over the place, almost obscuring the sun's light. North and south the atmosphere is similarly murky, and all over the coal region, which extends from the Coquet to the Tees, about fifty miles from north to south, the surface of the soil exhibits the signs of exten-

[1] In the Newcastle dialect, a chare is a narrow street or lane. At the local assizes some years since, one of the witnesses in a criminal trial swore that "*he saw three men come out of the foot of a chare.*" The judge cautioned the jury not to pay any regard to the man's evidence, as he must be insane. A little explanation by the foreman, however, satisfied his lordship that the original statement was correct.

sive underground workings. In every direction are to be seen swollen heaps of ashes and refuse, coals and slag, the rubbish of old abandoned pits, and the pumping-engines and machinery of new. As you pass through the country at night, the earth looks as if it were bursting with fire at many points; the blaze of coke-ovens, iron-furnaces, and coal-heaps reddening the sky to such a distance that the horizon seems to be a glowing belt of fire.

From the necessity which early existed for facilitating the transport of coals from the pits to the shipping places, it is easy to understand how the railway and the locomotive should have first found their home in the north. At an early period the coal was carried to the boats in panniers, or in sacks upon horses' backs. Then carts were used, to facilitate the progress of which tramways of flag-stone were laid down. This led to the enlargement of the vehicle, which became known as a waggon, and was mounted on four wheels instead of two. A local writer about the middle of the seventeenth century says, "Many thousand people are engaged in this trade of coals; many live by working of them in the pits; and many live by conveying them in waggons and wains to the river Tyne."[1]

Still further to facilitate the haulage of the waggons, pieces of planking were laid parallel upon wooden sleepers, or imbedded in the ordinary track, by which friction was still further diminished. It is said that these wooden rails were first employed by one Mr. Beaumont,[2] about the year 1630; and on a road thus

[1] 'Chorographia; or, a Survey of Newcastle-upon-Tyne.' Newcastle, 1649.

[2] "Some South gentlemen have, upon great hopes of benefit, come into this country to hazard their monies in coal-pits. Mr. Beaumont, a gentleman of great Ingenuity and rare Parts, adventured into our mines, with his thirty thousand Pounds, who brought with him many rare Engines, not known then in these Parts; as, the Art to bore with iron Rods, to try the Deepness and Thickness of the Coal; rare Engines to draw the water out of the Pits; waggons, with one horse, to carry the coals from the Pits to the Stathes on the River, &c. Within a few Years, he consumed all his Money, and *rode Home upon his light Horse.*" —Harleian MS. vol. iii. 269.

laid, a single horse was capable of drawing a large loaded waggon from the coal-pit to the shipping staith. Roger North, in 1676, found the practice had become extensively adopted, and he speaks of the large sum then paid for way-leaves, that is, the permission granted by the owners of lands lying between the coal-pit and the river-side to lay down a tramway for the purpose of connecting the one with the other. A century later, Arthur Young observed that not only had these roads become greatly multiplied, but formidable works had been constructed to carry them along upon the same level. "The coal-waggon roads from the pits to the water," he says, "are great works, carried over all sorts of inequalities of ground, so far as the distance of nine or ten miles. The tracks of the wheels are marked with pieces of wood let into the road for the wheels of the waggons to run on, by which one horse is enabled to draw, and that with ease, fifty or sixty bushels of coals." [1] Saint-Fond, the French traveller, who visited Newcastle in 1791, spoke of the colliery waggon-ways in the neighbourhood as superior to anything of the kind he had seen. He described the wooden rails as formed with a rounded upper surface, like a projecting moulding, and the waggon wheels as being "made of cast-iron, and hollowed in the manner of a metal pulley," that they might fit the rounded surface of the rails. The economy with which the coal was thus hauled to the shipping places was urged by him as an inducement to his own countrymen to adopt a similar method of transit.[2]

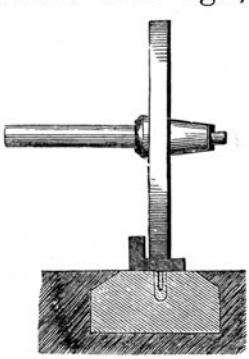
Similar waggon-roads were early laid down in the coal districts of Wales, Cumberland, and Scotland. At the time of the Scotch rebellion, in 1745, a tramroad existed between the Tranent coal-pits and the small harbour of Cockenzie in East Lothian; and a portion

[1] 'Six Months' Tour,' vol. iii. 9.
[2] 'Travels in England, Scotland, and the Hebrides,' vol. i. 142.

of the line was selected by General Cope as a position for his cannon at the battle of Prestonpans.

In these rude wooden tracks we find the germ of the modern railroad. Improvements were gradually made in them. Thus, at some collieries, thin plates of iron were nailed upon their upper surface, for the purpose of protecting the parts most exposed to friction. Cast-iron rails were also tried, the wooden rails having been found liable to rot. The first iron rails are supposed to have been laid down at Whitehaven as early as 1738. This cast-iron road was denominated a "plate-way," from the plate-like form in which the rails were cast. In 1767, as appears from the books of the Coalbrookdale Iron Works, in Shropshire, five or six tons of rails were cast, as an experiment, on the suggestion of Mr. Reynolds, one of the partners; and they were shortly after laid down to form a road.

In 1776, a cast-iron tramway, nailed to wooden sleepers, was laid down at the Duke of Norfolk's colliery near Sheffield. The person who designed and constructed this coal line was Mr. John Curr, whose son has erroneously claimed for him the invention of the cast-iron railway. He certainly adopted it early, and thereby met the fate of men before their age; for his plan was opposed by the labouring people of the colliery, who got up a riot in which they tore up the road and burnt the coal-staith, whilst Mr. Curr fled into a neighbouring wood for concealment, and lay there *perdu* for three days and nights, to escape the fury of the populace.[1] The plates of these early tramways had a ledge cast on their edge to guide the wheel along the road, after the manner shown in the annexed cut.



[1] 'Railway Locomotion and Steam Navigation, their Principles and Practice.' By John Curr. London, 1847.

In 1789, Mr. William Jessop constructed a railway at Loughborough, in Leicestershire, and there introduced the cast-iron edge-rail, with flanches cast upon the tire of the waggon-wheels to keep them on the track, instead of having the margin or flanch cast upon the rail itself; and this plan was shortly after adopted in other places. In 1800, Mr. Benjamin Outram, of Little Eaton, in Derbyshire (father of the distinguished General Outram), used stone props instead of timber for supporting the ends or joinings of the rails. Thus the use of railroads, in various forms, gradually extended, until they became generally adopted in the mining districts.

Such was the growth of the railway, which, it will be observed, originated in necessity, and was modified according to experience; progress in this, as in all departments of mechanics, having been effected by the exertions of many men, one generation entering upon the labours of that which preceded it, and carrying them onward to farther stages of improvement. We shall afterwards find that the invention of the locomotive was made by like successive steps. It was not the invention of one man, but of a succession of men, each working at the proper hour, and according to the needs of that hour; one inventor interpreting only the first word of the problem which his successors were to solve after long and laborious efforts and experiments. "The locomotive is not the invention of one man," said Robert Stephenson at Newcastle, "but of a nation of mechanical engineers." The same circumstances which led to the rapid extension of railways in the coal districts of the north, tended to direct the attention of the mining engineers to the early development of the powers of the steam-engine as an effective instrument of motive power. The necessity which existed for a more effective method of hauling the coals from the pits to the shipping places, was constantly present to many minds; and the daily pursuits of a large class of mechanics occupied in the management of steam power, by which the coal was

raised from the pits, and the mines were pumped clear of water, had the effect of directing their attention to the same agency as the most effective means of accomplishing that object.

Among the upper-ground workmen employed at the coal-pits, the principal are the firemen, enginemen, and brakesmen, who fire and work the engines, and superintend the machinery by means of which the collieries are worked. Previous to the introduction of the steam-engine the usual machine employed for the purpose was what is called a "gin." The gin consists of a large drum placed horizontally, round which ropes attached to buckets and corves are wound, which are thus drawn up or sent down the shafts by a horse travelling in a circular track or "gin race." This method was employed for drawing up both coals and water, and it is still used for the same purpose in small collieries; but where the quantity of water to be raised is great, pumps worked by steam power are called into requisition.

Newcomen's atmospheric engine was first made use of to work the pumps; and it continued to be so employed long after the more powerful and economical condensing engine of Watt had been invented. In the Newcomen or "fire engine," as it was called, the power is produced by the pressure of the atmosphere forcing down the piston in the cylinder, on a vacuum being produced within it by condensation of the contained steam by means of cold-water injection. The piston-rod is attached to one end of a lever, whilst the pump-rod works in connexion with the other,—the hydraulic action employed to raise the water being exactly similar to that of a common sucking-pump.

The working of a Newcomen engine is a clumsy and apparently a very painful process, accompanied by an extraordinary amount of wheezing, sighing, creaking, and bumping. When the pump descends, there is heard

a plunge, a heavy sigh, and a loud bump: then, as it rises, and the sucker begins to act, there is heard a creak, a wheeze, another bump, and then a strong rush of water as it is lifted and poured out. Where engines of a more powerful and improved description are used, the quantity of water raised is enormous—as much as a million and a half gallons in the twenty-four hours.

The pitmen, who work out the coal below ground, or "the lads belaw," as they call themselves, are a peculiar class, quite distinct from the workmen employed on the surface. They are a people with peculiar habits, manners, and character, as much so as fishermen and sailors, to whom, indeed, they are supposed, perhaps from the dangerous nature of their calling, to bear a considerable resemblance. Some forty or fifty years since they were a very much rougher and worse-educated class than they are now; hard workers, but very wild and uncouth; much given to "steeks," or strikes; and distinguished, in their hours of leisure and on pay-nights, for their love of cock-fighting, dog-fighting, hard drinking, and cuddy races. The pay-night was a fortnightly saturnalia, in which the pitman's character was fully brought out, especially when the "yel" was good. Though earning much higher wages than the ordinary labouring population of the upper soil, the latter did not mix nor intermarry with them; so that they were left to form their own communities, and hence their marked peculiarities as a class. Indeed, a sort of traditional disrepute seems long to have clung to the pitmen, arising perhaps from the nature of their employment, and from the circumstance that the colliers were amongst the last classes enfranchised in England, as they were certainly the last in Scotland, where they continued bondmen down to the end of last century. The last thirty years, however, have worked a great improvement in the moral condition of the pitmen; the abolition of the twelve months' bond to the mine, and