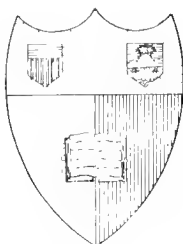

THE RIVER TYNE:

Its History and Resources.



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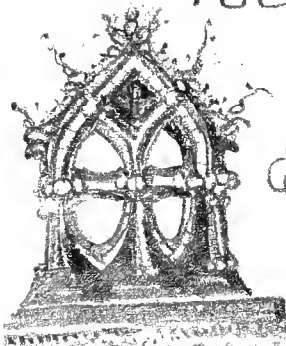
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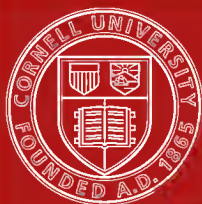
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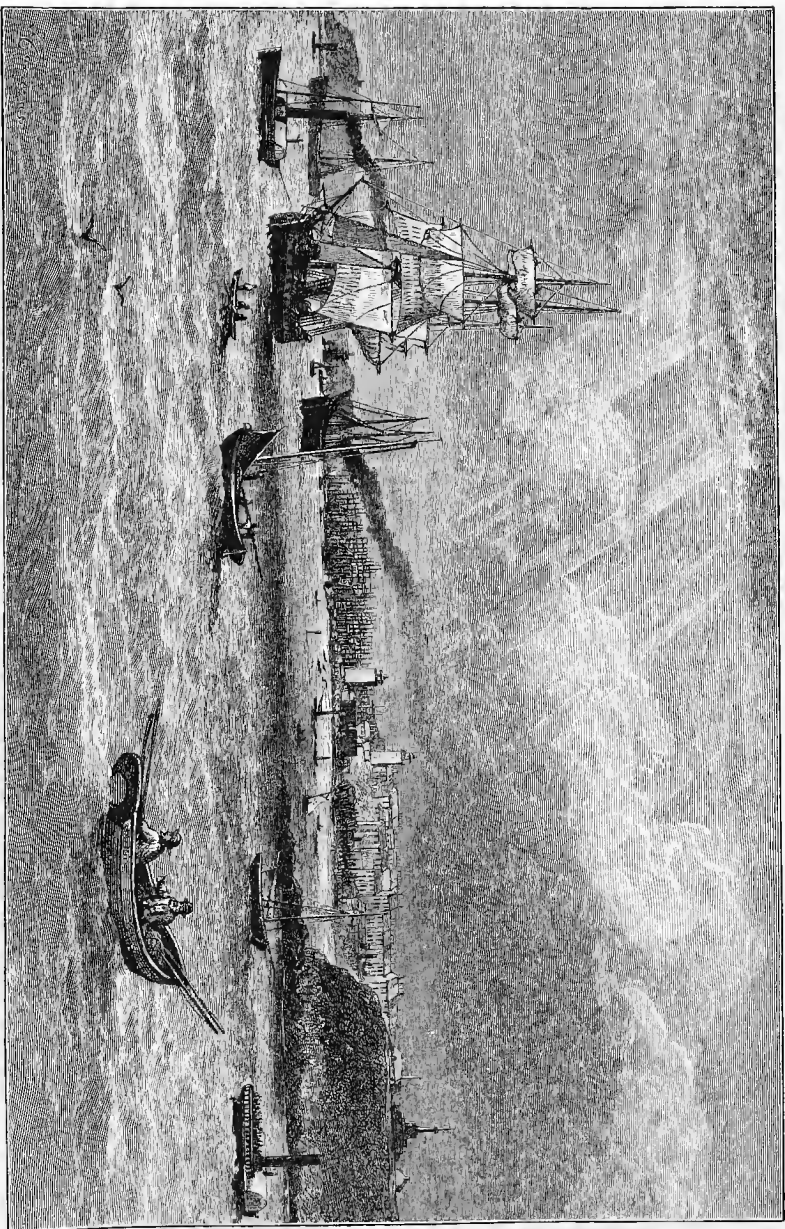
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THE RIVER TYNE.



Shields Harbour.—Entrance to the River Tyne.

THE
RIVER TYNE:

ITS
HISTORY AND RESOURCES.

BY THE LATE
JAMES GUTHRIE,
SECRETARY TO THE RIVER TYNE COMMISSION.

I L L U S T R A T E D .

“I know not where to seek, even in this busy country, a spot or district in which we perceive so extraordinary and multifarious a combination of the various great branches of mining, manufacturing, trading, and shipbuilding industry, and I greatly doubt whether the like can be shown, not only within the limits of this land, but upon the whole surface of the globe.”—*Extract from the speech of THE RIGHT HONOURABLE W. E. GLADSTONE, M.P., Chancellor of the Exchequer, on his visit to Newcastle-upon-Tyne, 1862.*

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P R E F A C E .

THE gentle memory of the Author calls for some few words of Preface to his posthumous work. For some years in more or less advanced forwardness for publication, it was his intention that it should appear about the present time ; and his purpose is fulfilled, but without the advantage of his final supervision. Imperfections it may well possess that he would have removed ; although in his absence the desire has not been wanting for their prevention. Blanks that he had left have been filled with care, and difficulties disposed of as successfully as might be. Yet still, the loss of his guiding hand may only partially have been overcome. Considerate allowance, however, will be made for whatever defects are discovered in a volume that the writer has not read. He had long contemplated its production, and been preparing for it amid the more

pressing claims of his daily duties. For the performance of such a task he had special fitness and facilities. It was also a labour that lay near his heart. The interest which he took in the River and its History was evinced towards the close of the past year, when, being a member of the Committee of the Literary and Philosophical Society of Newcastle, he took part in the Course of Lectures of the Winter Session, having chosen for his subject—"Tyneside before the Norman Conquest." In the service of the River Tyne Commission the greater portion of his manhood had been passed. His tenure of office went almost back to the date of the Conservancy Act of 1850; and as he was familiar with the controversies that led to its achievement, its harvests were gathered under his eye, and were in considerable measure the fruit of his husbandry. Of the spirit and ability that characterized his course in connection with the Commission, not a syllable need be said in addition to the tributary words of the Member for South Shields, Mr. J. C. Steven-

son, reprinted on another page. They must have recalled to many a thoughtful mind, on their first appearance some months ago, the earlier days of the deceased, spent in the neighbouring borough of Gateshead, where the same virtues and graces were manifest in his less conspicuous walk of life. Wisdom and gentleness, a true heart and a sound understanding, marked his youth. Self-reliant, yet unassuming, he won his way without effort to general favour, inspiring respect and affection. Rare was the combination of gifts with which he was endowed. Ready of speech and pen, easy and pleasant in deportment, conciliatory and persuasive, and still the same with every change of fortune, the world came to his side through life as by natural law, and was ever bidding him move up higher. Ripe beyond his years, his fellow-members of the Gateshead Mechanics' Institute placed him on their Committee in 1844, at the age of 18. The suffrages of his seniors kept him there from year to year, and in 1853 elected

him to the office of Secretary. It was in the opening month of the same year that he received his first appointment under the Tyne Improvement Commission; and before it closed he was discoursing to his fellow-members beyond the Tyne on the value of Mechanics' Institutes in diffusing knowledge tending to health and happiness. Profiting by every opportunity of instruction and culture that came within his reach, he had joined the Gateshead Institute in his teens; and during his prolonged membership he gave back to it large recompense for the benefits it had bestowed. It was early in life one of his opportunities and privileges to serve under the Town Clerk of Gateshead, the late Mr. William Kell; and he had also, afterwards, the advantage of being associated with the Town Clerk of Newcastle, Mr. John Clayton, and eventually the honour of succeeding him as Clerk of the River Commission. Would that his life of public usefulness had been of longer duration! But into his brief span of years what an amount

of fruitful labour was compressed ! He died full of service to his generation, and profound was the sorrow over his early removal. The long procession of the 14th of February, on the Elswick Road, eloquently expressed the grateful esteem of the community of the Tyne. The Chief-Magistrate of Newcastle (Mr. Richard Cail) was there ; River Commissioners and Councillors ; friends and fellow-townsmen. Tyneside was appropriately represented in rendering the last mark of respect to the memory of the departed Secretary, as he was borne to his burial by the side of the River whose interests he had served so well.

Newcastle, May 13, 1880.

THE RIVER COMMISSION AND MR. GUTHRIE.

The CHAIRMAN (Mr. Alderman Ridley) explained to the Commissioners, on Thursday, the 19th of February, 1880, that the ordinary monthly meeting would have been held on the 12th, but for the untimely death of their respected Secretary, Mr. James Guthrie. It was a most serious loss to the Commission, and it would be well to send a letter of condolence to the family.

Mr. J. C. STEVENSON, M.P., said that before they proceeded with the ordinary business, it was expected that some notice should be taken of the serious loss they had sustained since their last meeting. It fell to his lot only a month ago to move that a letter of condolence should be sent to the family of the late Mr. Ralph Park Philipson (Town Clerk of Newcastle and Member of the River Commission), the reply to which they had just heard read. But he little thought that he would have a similar duty to perform that day, and to move a vote of condolence with the family of their late Secretary. He had known Mr. Guthrie through the whole of his connection with the Commission, and he had to ask them to give expression to a resolution of the deep regret which they felt at the great loss they had sustained by his sudden removal. Many of them remembered how from the very beginning Mr. Guthrie had given his great talents and attention to the business of the Board. Since he entered the service of the Commission, it had grown from its small beginnings to the large and important Trust which it now was. During all the negotiations, all the Parliamentary inquiries, all the financial arrangements, which had grown in magnitude and importance with the growth of the Commission, Mr. Guthrie had taken his full share, and his services were of the very greatest value indeed. He gave to the business of the Commission his great abilities, his

great care, his admirable memory, and the extreme caution which characterised all his business transactions. While he was most courteous to all with whom he came in contact, he showed at the same time a firmness and decision which were all the more telling and influential because they were accompanied by so much modesty of demeanour. He won the confidence of every member of the Board. He was sure many of them, although they might have differed on various points of policy, had always felt the advantage of having a private talk with Mr. Guthrie as to what ought to be done. He believed the harmony on the Board was greatly due to the respect and attention which Mr. Guthrie paid to the suggestions that were made to him from all sides, and from members of the Commission, as to the policy which was under discussion. He won all their confidence by his conduct. He thought they should take special notice of Mr. Guthrie's very great and valuable services in regard to the finances of the Board. The finances were of a limited character at first, and then soon they grew under his hand and under his management until they had attained their present important dimensions. He could not help thinking that the good credit in which he was glad to think the Commission's finances now stood in the money market, was very greatly due to the caution, wisdom, and incessant attention Mr. Guthrie gave to them. That scheme of his which he suggested and carried out so successfully of amalgamating all the funds of the Trust, which were so confusing in their variety, and which it was impossible to make outsiders understand with reference to the nature of the security which the Commission offered them when they advanced money—that most important scheme, the almost sheet-anchor of their finances, was devised and carried out with great success by Mr. Guthrie—namely, the consolidation of all those various funds into one. For that service alone which he rendered to the Board he deserved their most grateful recognition. They must all feel that his situation was one which could never be supplied. However able might be his successor, he could not have that long and

intimate knowledge of the past transactions of the Commissioners which Mr. Guthrie possessed. He did not wish to occupy more of their time, but he had put upon paper a minute to this effect, which he begged the Commissioners to adopt:—“The Commissioners desire to record their profound regret at the loss they have sustained by the sudden death of their Secretary, Mr. James Guthrie, on the 11th inst. Mr. Guthrie entered the service of the Commission as Accountant in the second year of its existence; and having for some years discharged the duties of Secretary, he was formally appointed to that office in 1861. After the retirement of Mr. John Clayton, Mr. Guthrie was appointed Clerk in 1874. His intimate and accurate knowledge of the affairs of the Commission from the beginning, his ready recollection of all their transactions, and the cautious wisdom with which he brought his information to assist the deliberations of the Board, were of the greatest service. His good temper and courtesy were unflinching. The careful attention which he gave to the financial affairs of the river, and especially the skill with which he devised and carried out the scheme of consolidating the various funds of the Trust, especially deserve the recognition of the Commission, the success of his efforts being seen in the financial credit of the Commission at this time.” So far they ought to put on record the expression of their regret at his loss. But he considered a little more than that should be done, and that was to convey their sympathy to the family at the loss which they had sustained, and this might take the form of a second resolution, which he had written as follows:—“The Commission desire to convey to Mr. Guthrie’s family their deep sympathy with them in their sudden and mournful bereavement.” He begged to move these two resolutions, which he hoped would commend themselves to the Board as being suitable under the circumstances.

Mr. Ald. HODGSON seconded the resolutions, which were agreed to unanimously.

INTRODUCTION.

PERHAPS in no Port in the Kingdom have there been longer or more numerous contests of jurisdiction and interests than in the Tyne. Situated on the frontiers of Scotland, and for ages forming a bulwark and defence against Northern Invasion, the ancient town of Newcastle-upon-Tyne had bestowed upon it many Royal Charters and Privileges; amongst others, the exclusive Conservancy of the River, with large revenues arising therefrom.

How the possession of these Conservancy Powers, and their administration by the Corporate Body, were from time to time assailed, and how eventually, with the rise of other important towns and interests besides Newcastle on the banks of the river, the Conservancy took its present modern form of a Mixed Representative Commission, followed by the successful efforts made for River Improvement, is told in the bulky form of many a dry Blue Book and unwieldy masses of Parliamentary and Legal Docu-

ments, which few will ever care now to wade through. The Writer, from his official position, having necessarily a minute acquaintance with Tyneside affairs, has here attempted to concentrate and place before the public the leading outlines of the History of the Tyne as a navigable and trading river; glancing at its position in far past times, and describing, shortly, the successive stages of its improvement and development.

In obtaining materials for the preliminary chapter, free use has been made of local histories, more especially of valuable information given in papers contributed to different Societies by the late John Hodgson Hinde, Esq., the late Thomas John Taylor, Esq., and others. In all cases it has been endeavoured to use facts and information impartially, so as to provide a handy book of reference on Tyne matters. For those disposed to inquire more minutely, sufficient indication will be found of the sources where further detailed particulars can be had by the studious reader.

J. G.

THE RIVER TYNE.

EARLY HISTORY OF THE RIVER.

THE River Tyne is formed by the junction of the two streams of the North Tyne and the South Tyne, at a point a little westward of the town of Hexham. The North Tyne has its sources on the borders of Scotland, receiving on its course the Reed and other feeders. The South Tyne, commencing near Cross Fell, in Cumberland, flows past Alston and Haltwhistle, incorporating on its way the Nent, the Allan, and other tributaries. The united stream then flows past Hexham (being augmented by the Devilswater at Dilston) to Hedwin Streams, near Ryton, where it meets the tidal rise. The Derwent joins near Swalwell, the Team at Dunston, and other smaller streams at various places, before the debouchure of the river into the sea at Tynemouth.

The length of the river from its sources is as follows:—

	Miles.
North Tyne	43
South Tyne	39
The Tyne from the junction to Hedwin Streams	17½
From Hedwin Streams to the Sea	19
Total ...	118½

The extent of country drained by the river and its tributaries is taken at 1,142 square miles, of which 894 are in the County of Northumberland, 177 in Durham, 64 in Cumberland, and 7 in Scotland.

Nothing definite is known of the origin of the designation "Tyne," nor is the river known by that name until the Saxon period, the first reference to its present appellation being in Bede's "Ecclesiastical History," and in some old record of the Monastery of Tynemouth.

Conjectures have been made that the River "Vedra," shown on the Roman map of Britain, is the Tyne, while other authorities think the River Vedra is the Wear, but nothing is certain. It is strange that a river of the dimensions of the Tyne should have been totally omitted by Ptolemy, the compiler of the map.

In ancient times the river must have undergone great changes in its bed and course. The late Thomas John Taylor supposed that the main stream may have anciently flowed through the Team Valley, its outlet into the tidal river being by a waterfall at Bill Point, or possibly there may have been a communication with the River Wear by the Team Valley.

The channel above Newcastle has worked itself—as is usual with streams in a natural state—in a very tortuous course, forming the serpentine bend from

Newburn to Lemington, the King's Meadows Island, and other distinctive features; and there is no doubt that even within the historic period great physical alterations have taken place at the mouth.

Indeed, the river may be looked on now as composed of two portions, the portion down to Bill Point consisting of the drainage of the country within its range; and from the limited extent of that area, as well as from the short length of country composing it, the Tyne down to this point does not form naturally more than a comparatively small river. In the wider reaches below Bill Point the river has more the character of a sea inlet or estuary, its characteristic features, especially near the entrance, being evidently the result of tidal influences rather than those of land water.

The Tyne flows through a country of great natural beauty, the valley of the North Tyne being remarkably noble and picturesque, as well as that of the South Tyne from Alston; whilst the main river, past Hexham and downwards to the sea, passing through a rich and fertile vale, must, before the days of coal-mining and manufacturing industry, have presented a charming scene of wood and water, with gently rolling hills and sheltered nooks and glades, and the features which make up a generally beautiful landscape. Until very recent times, and even within the memory of men still living, the banks below

Newcastle, especially at Saint Anthony's, Heworth, Hebburn, and other places in the now busiest sections, continued to abound in features of great pleasantness and rusticity. This old beautiful and unsmoky Tyne would run its course in bygone ages, with savage tribes alone to disturb the silence of its glades and forests, slowly working its many physical changes, but without any indication of the coming time which was to mark the alterations effected on its banks by Roman and Saxon, Dane, Norman, and by mediæval England, and finally to transform it into the river it now is, of coal, iron, and chemicals, and the various seething populations and active industries of which it is a head and centre.

We have many references to the Tyne, although, as just stated, not certainly known by that name, during the occupation of Britain by the Romans. One of the Roman stations was called Pons Ælii, occupying part of the site of the present town of Newcastle-upon-Tyne; a bridge having been constructed across the river by the Emperor Hadrian in the second century of our era. Very probably some Roman works were also constructed on the opposite side of the river at Gateshead. It comes not within the compass of this sketch to make reference to the numerous relics of Roman occupation in the district, but merely to give a glance in passing at the presence of that wonderful people on the Tyne. The

Roman masonry recently excavated at The Lawe, South Shields, and other signs of Roman residence, give evidence of the permanency of their presence, and countenance to the opinion entertained by some authorities that portions of the famous Roman legions which occupied the country of the Wall may have come in Roman vessels to the Tyne. The Lawe at that time would be an island at the mouth of the river, the present channel being then as now on the north, with another channel through the Mill Dam at South Shields on the south.

From the Roman period, through the Angle or Saxon and Danish period, whilst the Tyne was a component part, first of the kingdom, and, secondly, of the official earldom of Northumberland, we have few references to the Tyne in a trading point of view; but this period abounds in events of historic interest which took place on its banks. Northumbria was an early seat of civilization amongst the Saxons. Tynemouth, Hexham, Jarrow, and other churches and monasteries testify to this abundantly. All these establishments were, however, ruthlessly destroyed afterwards by the pagan Danes.

In the reign of King Ecfred, Jarrow was called King Ecfred's Haven, and is stated to have been able to contain all the royal vessels of that day. The river or inlet of the Don was anciently much more extensive than at present, and in the Saxon days was

of the nature of a small estuary. According to tradition vessels could proceed up the Don to a distance of three miles inland from Jarrow.

There was anciently also a considerable stream or inlet at the Spital Dene, North Shields. Remains of what appear harbour works have been found at this place, and it is not improbable that the early priors of Tynemouth may have had a small harbour there.

During the long dark night which ensued on the cessation of the Roman power, and the establishment of the Saxon dominion, we get no glimpse of the Tyne, nor, indeed of anything certain in English history. Fearful and bloody inroads of Picts and Scots, arriving shoals of Angles, Jutes, and Saxons, with their murderous warfare on the ancient inhabitants the Britons, is what we know to have taken place; and when, after this darkness of a century and a half, history again throws a dim light on the scene, we find the district forming part of the sometimes dual, and sometimes united, Saxon kingdom of Northumbria. Under the Northumbrian kings Christianity is again introduced among the pagan inhabitants by Paulinus from Kent and Aidan from Iona. The foundations of the great see of Durham are laid by Aidan in the church formed at Lindisfarne, or Holy Island. The monastic system is established and rapidly spreads. Churches and monasteries are founded at Monkwearmouth and

Jarrow, and we find the old Pons Ælii, the military station of the Romans, referred to by the appellation of Monkchester. The cathedral of St. Wilfrid, now the Abbey Church of Hexham, is erected. The stately and beautiful priory of Tynemouth rises through the piety and munificence of Northumbrian kings, who endowed the place with princely gifts. The earliest religious house is said to have been founded at Tynemouth by King Edwin, and a church of stone first built by King Oswald.

The dominions of Northumbria were at times extensive, comprising the whole country embraced between the Humber and the Forth. York, which had been the principal city of the Romans in Britain, was, in the undivided state of Northumbria, its chief town, and the seat of its kings and government. So great and flourishing at one period was the power of Northumbria, and its controlling influence on the so-called Heptarchy, that it seemed as likely to become supreme, and incorporate the other kingdoms, as that this should be, as was afterwards done, by the kingdom of the West Saxons. Had Northumbria instead of Wessex prevailed, the seat of English government and power might have been located in the north instead of the south, and York possibly have become the capital instead of London. The northern kingdom was, however, weakened from various causes, and ultimately destroyed by the in-

vasions of the Danes, and in its latter stages of precarious existence was in reality a Danish kingdom. According to the late John Hodgson Hinde, King Athelstan is believed to have been the first English sovereign who reduced the Northumbrian kingdom under his own immediate authority, although it had been previously, like the rest, brought under the nominal sway of Wessex by Egbert. The ruthless invasions of the Danes, again and again renewed, produced a period of horrors and confusion second only to what must have occurred on the departure of the Romans. Various fleets of these marauders arrived in the Tyne. The consequent sack and pillage of all the religious houses, notably Lindisfarne, Jarrow, Tynemouth, Monkwearmouth, and Monkchester, threatened to extinguish once more the light of Christianity, and cause a relapse into primitive barbarism. Halfdene, or Halfden, the famous Danish chief, one of the main destroyers of the Northumbrian Saxon kingdom, who sailed into the Tyne with a great fleet of savage warriors, is supposed to have wintered in the Don (or, as others think, at or near the Teams), and from thence in the spring commenced his devastation and destruction of the unfortunate district.

The next distinct references we have to Tyneside occur in that great epoch of English history, the Norman Conquest. William I. was here himself

in or about the year 1072. Monkchester, or Newcastle, must then have been a very insignificant place; for it is recorded that when the Conqueror was obliged to halt there on his return from his Scottish campaign, the royal army might have perished by famine but for the proximity of the storehouses of Tynemouth monastery. There was then also existing at Tynemouth a castle belonging to the Earls of Northumberland. A Roman fort had undoubtedly existed on the Moot Hill, on or near the site of the present Moot Hall, at Newcastle. Robert, the son of the Norman Conqueror, on the occasion of an unsuccessful expedition against Malcolm, King of Scotland, about 1080, took possession of this hill and erected on it a new fortress. This appears to have been simply a military fortress and nothing more. On the rebellion in 1095 of Robert Mowbray, the last official Earl of Northumberland who held this fortress, as well as his own castle at Tynemouth and the castle of Bamborough, King William Rufus builded what is called the "New Castell," which gave its name to and laid the foundations of the modern town of Newcastle-upon-Tyne. In the words of the old chronicler it is said of Rufus—

“He builded the Newcastle-upon-Tyne
The Scottes to gainstand, and to defend
And dwell therein. The people to incline
The town to build, and wall, as did append,

He gave them ground and gold full great to spend,
To build it well, and wall it all about,
And franchised them to pay a full rent out."

The Norman Conquest inflicted terrible sufferings on this district. The Northumbrians and the Scots, offering most resolute resistance to the Conqueror, brought on their heads savage and relentless vengeance.

Gateshead comes prominently into notice in the time of William I., as the scene of a well-known tragedy having its origin in the maltreatment of the Saxon population by the Normans. Walcher, a Norman, had been appointed by the King to the see of Durham, and afterwards also raised to the dignity of Earl of Northumberland. In the year 1080, a Saxon nobleman, Liulph, had been murdered by some one supposed to be in the service of the Bishop. His lordship was not accused of implication in the crime, but of tardiness or unwillingness in according justice to the relations of the murdered nobleman. On the occasion of a visitation held by the Bishop at Gateshead, the native population, headed by a kinsman of Liulph, and others, surged round the assembly and threatened all with death. A retreat was made into the church. In vain the attendants of the Bishop, and finally himself, went to appease the angry Saxons. The church was fired, and all were slain. The old Jarrow monastery had

just previously to this been to some extent repaired and restored by the Bishop, after lying desolate for a couple of centuries succeeding the cruel ravages of the Danes, and a few Mercian monks been placed there. These pious monks came dolefully up the river in a vessel to Gateshead, and conveyed the mutilated body of the Bishop to the monastery, whence it was afterwards conveyed to and buried at Durham. A very similar murder had taken place a few years previously at another Tyneside church, that of Newburn, when an illustrious Anglo-Saxon, Copsi, who had likewise been one of William's earls or governors of Northumberland, was slain by his rival, Ossulph.

The vengeance taken by the Norman king for the murder of Walcher, and other misdeeds of the Northumbrians, was frightful, the district from the Tyne to the Tees being almost entirely depopulated.

Newcastle and Pandon were anciently distinct and separate places. On the eastern side of Monkchester lay the ancient ville of Pandon, or Pampedene, which was not incorporated with Newcastle until the twenty-seventh year of Edward I., being from thenceforth included in the same municipality. The great antiquity of Pandon is proverbial, as shown by the proverb, "As old as Pandon Gate." Grey, the writer of the "Chorographia," states that the kings of Northumberland sometimes resided here, in a

house afterwards known by the name of Pandon Hall. Brand believes this to be the site of a villa of King Oswy, and that Pandon is the same as *Ad Murum*, where took place, according to Beda, about 654, the baptism of Pœda, son of the celebrated heathen, Penda, King of Mercia, the deadly foe of the Northumbrian kingdom. Mr. Hodgson Hinde thinks it not improbable that the name Pandon was derived from this circumstance, as in the genealogy of the Mercian kings the name of Penda is written, not Pœda, but Pantha, and Pampedene may be merely a corruption of Pantheadene. As he says, such an important event as the baptism of a heathen Prince, heir to an adjoining kingdom, leading ultimately to the conversion of a whole people, was most likely to give a name to the Dene in which the immersion took place, whilst the eminence behind has preserved the original title of the villa in its English equivalent, Wall-knowle. Pœda was baptized by Bishop Finan of Lindisfarne. Having received four priests, who for their learning and good life were proper to instruct and baptize his people, the Prince returned home to Mercia with great joy. Amongst these priests was one Adda, brother to Utta, named by Beda as abbot of the monastery of Goatshead (*Ad Capræ Caput*). This latter reference seems to be the only mention of Gateshead in the Anglo-Saxon time.

Although Monkchester, or Newcastle, appears, as

before stated, to have been so insignificant in the reign of William I., we know from most authentic sources that at a very early period thereafter the town emerged into considerable commercial importance. This is proved beyond question by the account which we have of the "Laws and Customs" which the burgesses of Newcastle had in the time of King Henry I. These laws and customs were esteemed so valuable that not only were they adopted by Pudsey, Bishop of Durham, in his charters afterwards granted to Sunderland and Gateshead, but the celebrated *Leges Burgorum* of Scotland, instituted by David I., and dated at Newcastle, are nearly a *verbatim* transcript from them; and the boroughs of Scotland acknowledged the customs of Newcastle as precedents for their own government so fully, that they were in the habit, in cases of difficulty not provided for in their written laws, of referring for information to the burgesses of Newcastle. Of references of this kind instances are cited in the Scotch Acts of Parliament. To these Laws and Customs is attached a Table of Tolls, which is incorporated in the Scottish laws, and which furnishes an excellent view of the then articles of merchandize. The constitution of the borough, and the privileges of the burgesses, are set forth.

The following relate more directly to commerce:—

1. All merchandise ought to be brought to land, except salt and herrings, which may be sold on board.
2. But if a ship call at Tynemouth, and wishes to proceed on its voyage, the burgesses may buy from it what they please.
3. If a dispute shall arise between a burgess and a merchant, it must be determined within three tides.
4. No merchant, not being a burgess, can buy wool, nor hides, or other merchandise, without the borough; nor within it, except from a burgess.
5. None but a burgess can buy webs for dyeing, nor make them up, nor cut them.

The articles of export, besides wool and hides, named in the tolls, are the skins of foxes, martens, sables, beavers, goats, and squirrels; feathers, lead, &c.; the only imports named being alum, pepper, and ginger. Articles on which market tolls are charged are cattle, sheep, horses, pigs, herrings and other fish; corn, flour, fat, and lard; also, a toll on woad for dyers.

The salmon fisheries at this period were extraordinarily numerous and productive. In a Bishop's Charter to the prior and monks of Durham in 1103, twenty-eight fisheries are enumerated amongst the appurtenances of the cells of Tynemouth and Jarrow:

eight on the north side, in the parishes of Tynemouth and Wallsend; and twenty on the south side, within the parish of Jarrow; and in an inquisition in the reign of Henry I. there are stated to be, from Jarrow to Hedwin Streams on the south side, forty fisheries, the property of the Bishop of Durham, in the parishes of Gateshead, Whickham, and Ryton, and eight the property of the prior and convent, thus making no less than sixty-eight fisheries on the south side of the river, from Hedwin Streams to the sea. There would also be certainly more on the north side than the eight named: possibly as many as on the south side.

The men of the Shields fisheries were obliged to bring all their fish for sale to Newcastle, and the King was entitled to a prisage on such fish. What import trade there was at this period to Newcastle appears to have been carried on chiefly in foreign bottoms. The burgesses had, however, at that distant period, ships of their own, as there is a record of a person coming from Dunbar to Newcastle to buy a ship about the time of Stephen.

It is not often, if at all, that miracles now occur in trade, those wondrous events being more common in the records of past history than in these prosaic times. In the Life of Saint Oswine there is a grave account given of a miracle wrought at the shrine of that saint at Tynemouth, on the occasion of an offer-

ing made by a wealthy burgess of Newcastle called Faramannus, on the sailing of his vessel freighted with various wares for sale amongst the South Angles. It would appear that this early Tyne shipowner was a more devout son of the church, and more blessed accordingly, than the shipowners of this unbelieving generation; for we certainly never hear now of church offerings being made on a "good sea tide," or of any special saintly protection being gained as the result.

The first guild or fraternity of free merchants at Newcastle was founded by a charter of King John.

As showing the relative commercial importance of Newcastle with some other ports in the reign of John, the following figures are given, being an account of the produce of the fifteenth part of the goods of all merchants throughout the realm, granted to the Crown and rendered to the Exchequer in the seventh year of the king's reign, Newcastle being eighth on the list:—

	£	s.	d.
London	836	12	10
Boston	780	15	3
Southampton	712	3	7
Lincoln	656	12	2
Lynn	651	11	11
Hull	344	14	4
York	175	8	10
Newcastle	158	5	11

Sufficient has thus been shown to prove that Newcastle, in the reigns immediately succeeding the Conquest and before the advent of the great staple trade of coal export, was possessed of considerable trade, and ranked as one of the principal ports of the nation.

The woollen trade seems at an early period to have been very important, as we find numerous references to regulations affecting the export of wood from the port of Newcastle.

The lead trade also was important at a very early date, the ore being brought from the interior to Newcastle. The earliest found reference to the existence of a custom house at Newcastle is in the year 1281, when a duty of six shillings and eightpence was charged upon 300 woollen skins; the same sum upon a sack of wool; and thirteen shillings and fourpence upon a last of leather. (Hodgson's "Northumberland.")

By some it is believed that the use of coal was known to the ancient Britons: it was almost certainly partly used by the Romans during their occupation, and it was also probably used to some extent in the Saxon time.

The first distinct reference we have to the coal trade on the Tyne seems to be in the charter of King Henry III., in 1239, to the freemen of Newcastle to dig coals in the Castle Field and the Forth; and

about this time coal is referred to, from its passage to London by sea, as sea coal. It is very probable that coal was shipped in the Tyne before the end of the twelfth century. Certainly the export trade was in operation in the early part of the thirteenth century, and increased very rapidly towards its close; and with very slight interruption that great trade has continued ever since.

Many references are found to the working of coal on the Moor of Newcastle, at Elswick, at Gateshead, Birtley, Winlaton, and other places to the north, south, and west of Newcastle, in the fourteenth century.

In the year 1306 the use of coal in London was prohibited by royal proclamation, as being a public nuisance; but this proclamation, as well as later attempts on the same grounds to prevent its consumption, was nugatory, for we find coal in general use, even in the royal palace, in the early years of the fourteenth century.

Mr. Thomas John Taylor, in his paper on the Archæology of the Coal Trade, gives most interesting particulars rendered by Henry de Strother, Sheriff of Northumberland, of the cost of 576 chaldrons of coals purchased at Wynlatone (Winlaton), and shipped in the Tyne for London, for the use of the works going on at Windsor Castle during the reign of Edward III. in 1367. The price is given of the coals as purchased at Wynlatone; the cost of the

hire of the keels carrying the same to Newcastle, and putting the coals on board ship; of the wages of one John Taverner in superintending the loading of the coals; and the freighting of divers ships; also of the labour and expenses of one Hugh Hankyn, in travelling to London, and there abiding to receive the said coals from the masters of the ships, and delivering the said coals by indenture to Adam de Hertyn done, Clerk of our Lord the King; and thence returning home; their payments to the masters of the ships for their freights to London, and delivery of the coals at that port; the total cost, delivered in London, being four shillings and elevenpence per Newcastle chaldron.

Coals were shipped from Sunderland in the fourteenth century.

Coals wrought from mines in Bedlingtonshire were probably shipped in the same century from Blyth.

Mr. Taylor also mentions sums paid in the fourteenth century for the rent of mines of sea coals at Fenham.

That gentleman gives a clear account of the many and onerous duties imposed by the Crown on coals, owing partly to the facilities for the collection of such duties.

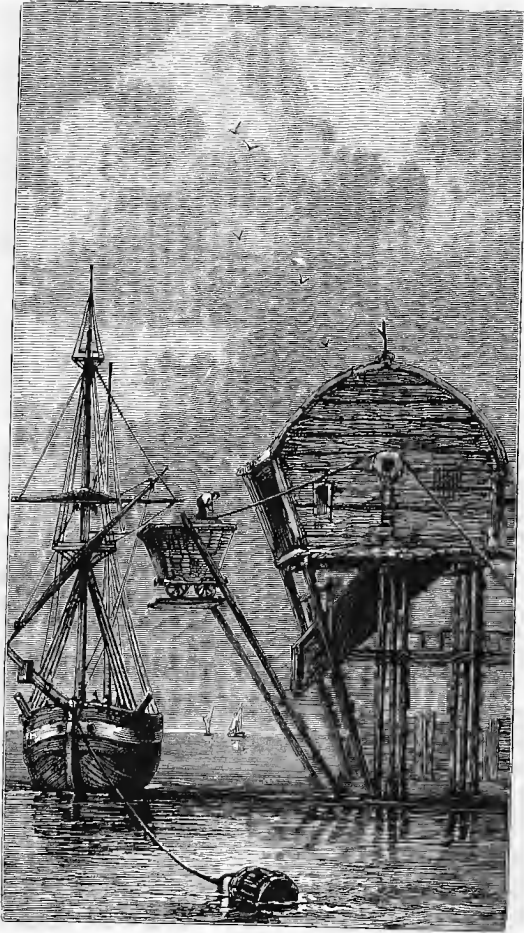
From 1421 to 1831 coal was never free from Government imposition. The origin of the Richmond shilling per chaldron, repealed so recently as

the latter year, appears to have been a duty of that amount imposed by Queen Elizabeth, in lieu of arrears of duties in prior existence. This shilling lasted during all the convulsions of the Great Rebellion, and was finally settled by King Charles II. on his natural son Charles, Duke of Richmond and Lennox, and, failing him and his heirs, on Louise, Duchess of Portsmouth. In 1799 it was sold to the Government by the Richmond family for an annuity out of the Consolidated Fund. The duty having existed in some shape for four hundred years, finally ceased in 1831.

Other very heavy duties were also imposed by Queen Elizabeth and King Charles I. on coal borne over-sea. After the Great Fire of London duties on coal were imposed for rebuilding the city and churches of the capital, which duties were long continued, and underwent many changes, happily at length disappearing altogether.

Duties on coal still, however, continue to be levied, called the London city dues for metropolitan purposes: these charges amount to one shilling and one penny per ton, and are levied on all coal entering within a circle of twenty miles radius from the centre of London, whether sea-borne or carried by rail.

Notwithstanding royal proclamations and fulminations and arbitrary impositions, and in despite



Old Coal Staith on the Tyne.

of troubled and adverse times, especially in the fifteenth century, this hardy trade lived and surmounted every obstacle to its expansion. There do not appear to be any really authentic accounts in existence of the extent of this trade previously to the end of the sixteenth century. In the latter century there are many evidences of the increasing use of coal for manufacturing purposes, and that it was also creeping, according to a writer in 1577, "from the forge into the kitchen and hall."

At the commencement of the seventeenth century, we find that 400 ships were employed in the Newcastle coal trade, carrying about 190,000 tons annually.

In 1650 the exports were 345,550 tons.

For some years previous to 1710 the exports from Newcastle were 475,000 tons—those from Sunderland at the same time being 175,000 tons.

In 1776 there were cleared annually on an average of six years 260,000 chaldrons, or about 680,000 tons, from Newcastle.

The progressive nature of the coal trade in the Tyne can be seen by a reference to the quantities shipped in 1795 and 1879. Early references to coal staiths, staythes, or steathes, as they were called, are met with. Those staiths originally were more in the nature of warehouses for the storing of coal, than the modern projections into the river for purposes of

shipping coal in deep water. In 1338 the Prior of Tynemouth lets a piece of ground in Newcastle for the purpose of storing sea coal.

The erection of the projecting spouts, staiths, &c., &c., was opposed by the keelmen of the Tyne, and indicted as a nuisance and obstruction to the river. The trial took place in 1824 at the assizes in York.

It is well known that the first, or one of the very first, successful applications of the steam locomotive was in the conveyance of coal on the Northumberland colliery railways; and with the old Wylam colliery engine, and George Stephenson's first engine in 1814 on the Killingworth colliery railway, may be said to have commenced the modern railway system.

The very early commerce of Newcastle appears to have been carried on, not in the Tyne itself—the Sandhill and lower parts of the present town being then covered with the tide—but in the Lort Burn, which passed down a ravine under the present site of Grey Street, Dean Street, and the Side. The tide ran far up this valley. The first houses erected in the Cloth Market had warehouses behind them, communicating with this burn, which was navigable to their doors up to the High Bridge. Afterwards the merchants moved lower down nearer the river, to the Side and the Sandhill. Here the shipping was accommodated, and the goods warehouses and offices

RIVER TYNE IMPROVEMENT.

CHART OF THE RIVER TYNE FROM THE SEA TO WYLLAM.

under the direction of W. J. F. Ure and W. P. J. Messent in 1875 with corrected depths to 1879 (where material alterations have occurred) at the Entrance from the Pier Heads to the Low Lighthouse and above Bridge from Newcastle to Elswick and Dunston

1880.

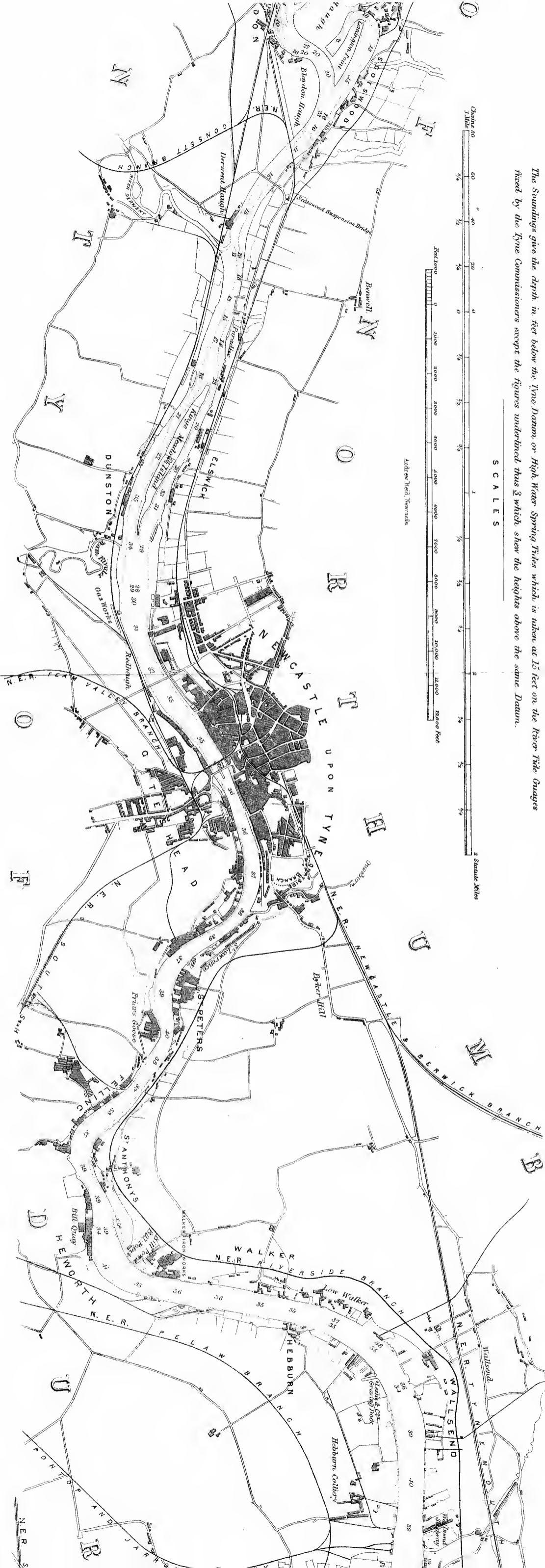
REFERENCE

The Soundings give the depth in feet below the Tyne Datum or High Water Spring Tides which is taken at 15 feet on the River Tide Gauges fixed by the Tyne Commissioners except the figures underlined thus 3 which show the heights above the same Datum.

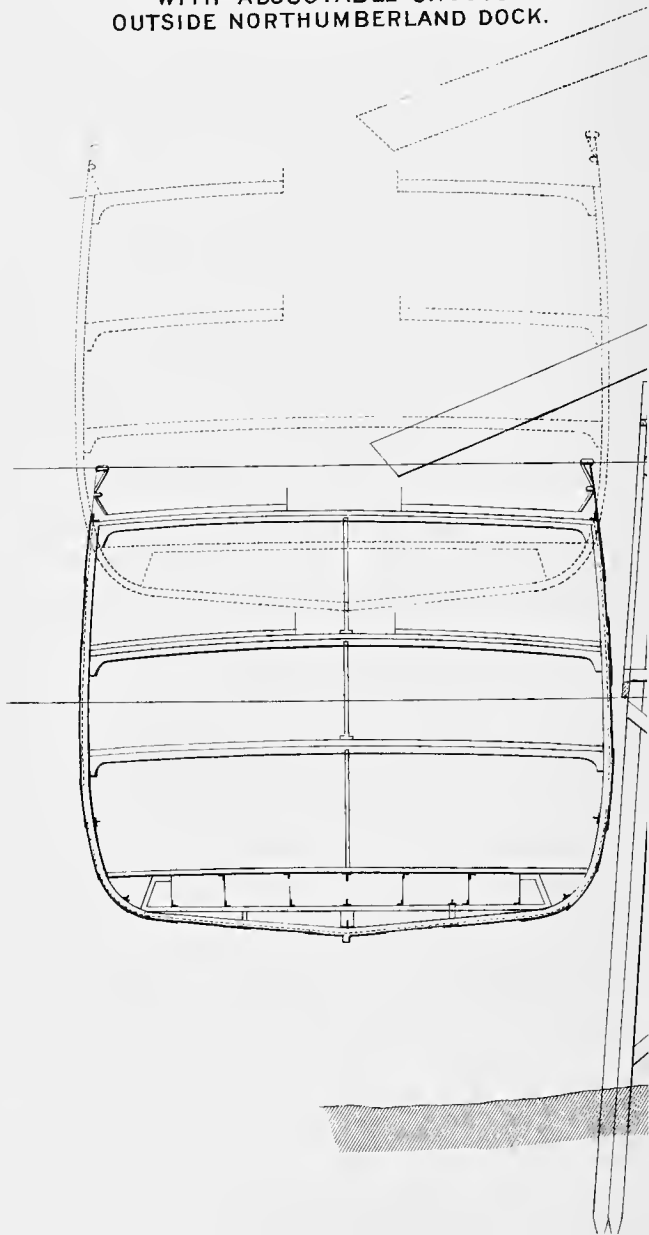
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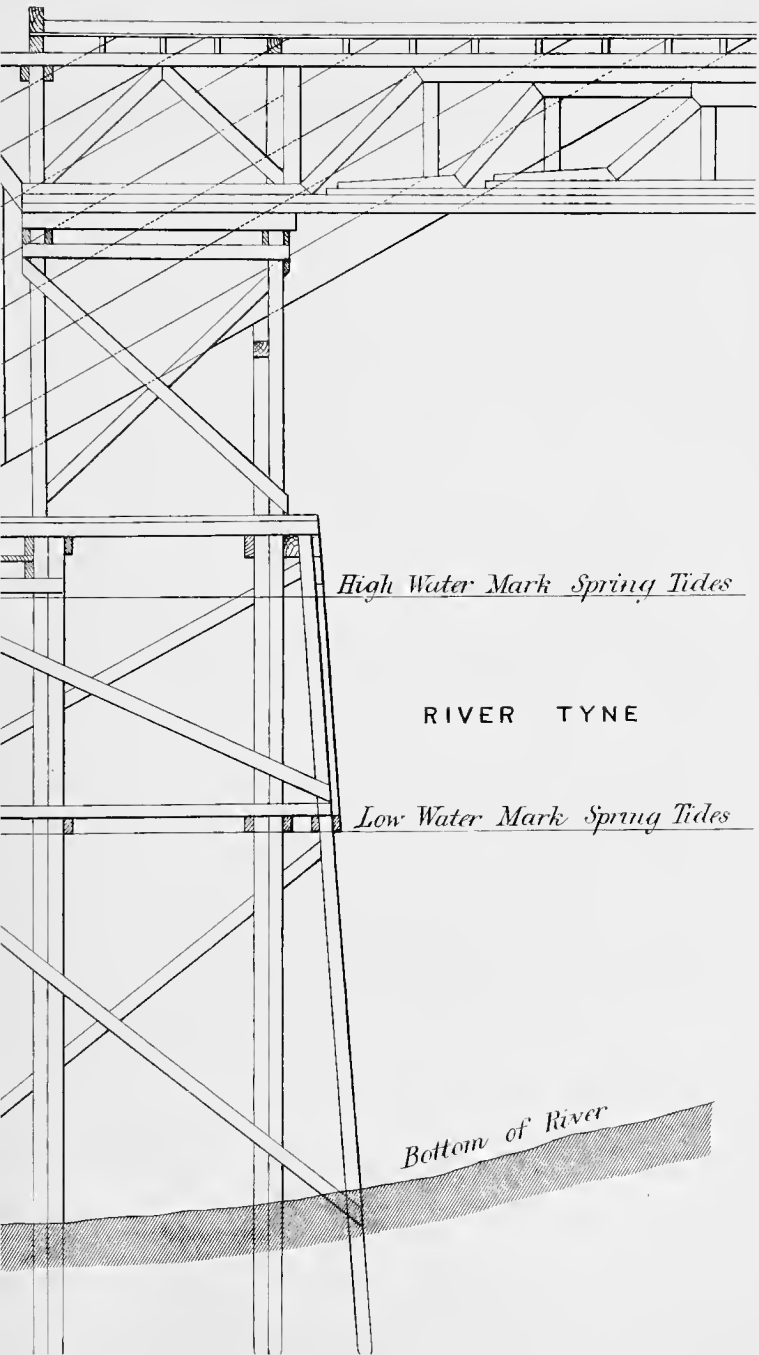


Andrew Reid, Newcastle



TYNE COMMISSIONERS COAL STAITHS
WITH ADJUSTABLE SHOOTS
OUTSIDE NORTHUMBERLAND DOCK.





High Water Mark Spring Tides

RIVER TYNE

Low Water Mark Spring Tides

Bottom of River

existed for a considerable time, until the increasing requirements of trade necessitated the erection of a quay or wharf in the Tyne itself; which quay did not for a long time afterwards extend further than for about half the distance from the Sandhill towards Sandgate.

Newcastle was at an early period surrounded by walls. Reference is made to the town walls in a charter of King John; they must therefore have been to some extent then in existence. The origin of the more extended walling of the town is generally stated to be that a wealthy merchant of the town, having been seized by the Scots, was carried away a prisoner. The walls were therefore begun to be built in the reign of Edward I.: the work was continued by the inhabitants, and finished in the reign of Edward III.

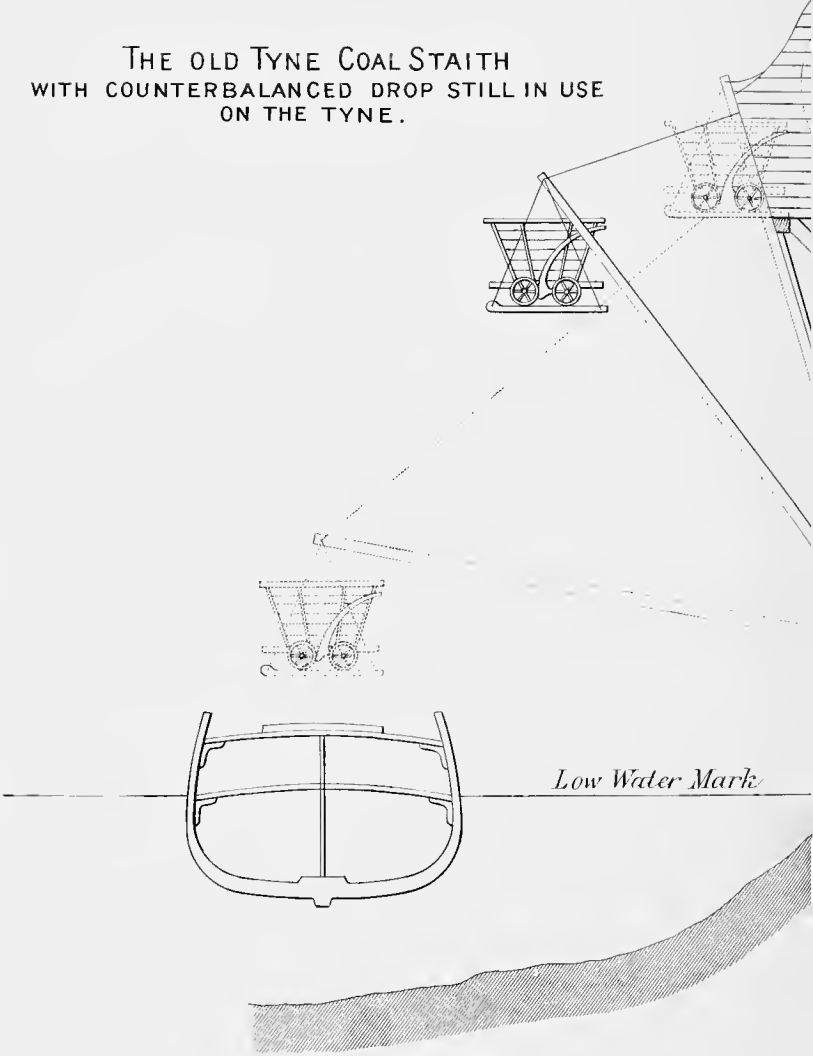
With regard to the population of the ancient town, Mr. Hinde estimates, on the basis of the Collectors' Returns for the Poll Tax imposed in 1377, that Newcastle then stood twelfth in population of the English towns, the number of its inhabitants being computed at 3,970. On the same basis the towns having a larger population are ranked as follows, viz. :—

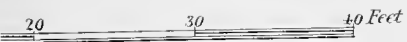
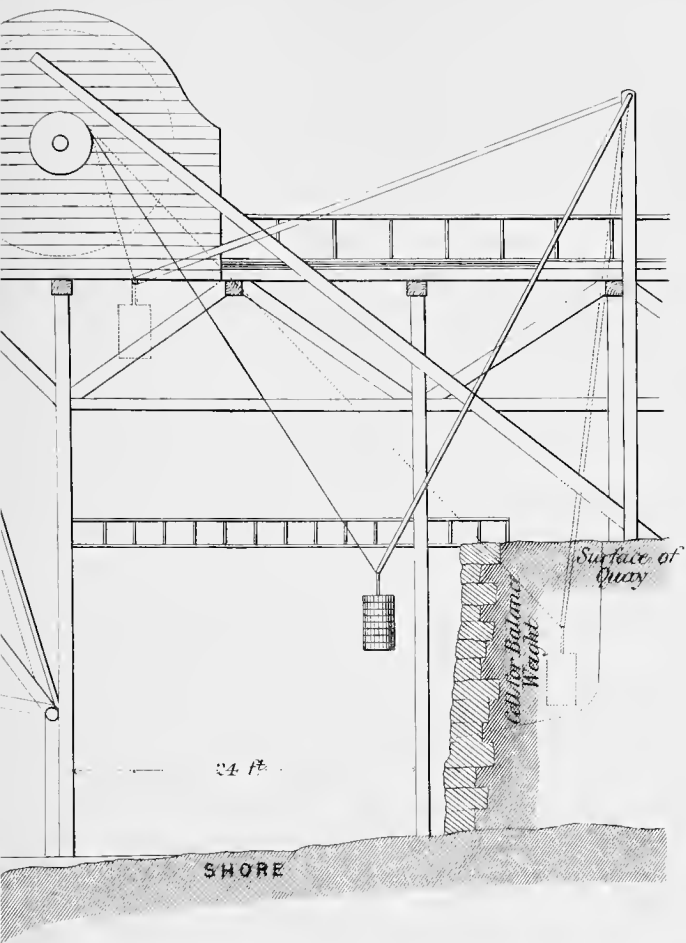
London	...	...	...	...	34,971
York	...	...	...	...	10,872
Bristol	...	...	...	...	9,517
Plymouth	...	...	...	...	7,255

Coventry ...	...	...	...	7,225
Norwich ...	...	...	...	5,928
Lincoln ...	...	...	...	5,350
Salisbury ...	...	...	...	4,839
Lynn ...	...	...	...	4,690
Colchester...	...	...	...	4,433
Beverley ...	...	...	...	3,994
Newcastle ...	...	...	...	3,970

We find so early as the reigns of William I. and II. the jurisdiction-boundaries of the river pretty well defined. In Brand's History we are told that in these reigns records ascertained the River Tyne to have been the ancient boundary between the County of Northumberland and the Bishopric of Durham, and that from Stanley Burn to Tynemouth a moiety of the water thereof on the south belonged to Saint Cuthbert and the See of Durham; that another moiety thereof on the north appertained to the County of Northumberland; and that the third and middle division was common and free, the whole to be measured at high tide. The Tyne, as we have seen, abounded then with fisheries; and it is not improbable that disputes with respect to them might have led to the before-named division. These same boundaries were again ascertained by inquisition held at Gateshead in 1323. Various charters and inquisitions are to a like effect, and tend to prove that for a considerable period the Bishop of Durham and the Corporation of Newcastle held con-

THE OLD TYNE COAL STAITH
WITH COUNTERBALANCED DROP STILL IN USE
ON THE TYNE.





currently the conservancy over the Durham and Northumberland sides of the Tyne. The Tyne was in these ancient days almost as much the port of Durham as of Northumberland. This state of things somewhat altered in course of time with the rise of Hartlepool and Sunderland, and the Tyne became more of a Newcastle or Northumbrian port. From whatever cause, however, we find that notwithstanding many disputes and contests between Newcastle and the Bishopric, the conservancy of the whole river came from the time of legal memory to be vested exclusively in and fully exercised by the Corporation of Newcastle.

The opponents of Newcastle contended that the concurrent claim of the Corporation to the ownership of the bed and soil of the river, wherever covered by the tide, was not by any means clear; alleging, that although by old inquisitions the Tyne and the soil thereof had belonged under the Crown to the Corporation of Newcastle, yet this proprietorship must have been subject to many qualifications. The grants and charters of the Crown to the Bishops of Durham and Priors of Tynemouth were in existence, or some of them, previous to these inquisitions; and various rights in the soil had been obtained from usage and custom by neighbouring proprietors. It is urged that had the rights of the Corporation to the freehold of the whole bed of the

river been as absolute as the Conservancy Powers, the towns of North Shields, South Shields, and Gateshead, which are all built on the ancient bed of the Tyne, would have been Corporation property, and that the site of the docks should have been paid for to the town. This was not so in any of the cases. The Duke of Northumberland, as inheritor of the adjoining lands, was declared the owner of the freehold of the Northumberland Dock. The freehold in Jarrow Slake, a space of upwards of 300 acres covered by the tide, was not in the Corporation. The Corporation are stated to have been in the seventeenth century applicants for the purchase of such freehold, and were refused; the Crown rights being sold to Thomas Talbot and Richard Allen of London, in the reign of Charles I. The site of the Tyne Dock, portion of the Slake, was, as we know, obtained by the North-Eastern Railway Company from the Dean and Chapter of Durham and from the heirs of Mr. Ellison, whilst that portion of the Slake now used as timber ponds was purchased by the Tyne Commissioners from the Drewitt family. There are other instances of this kind, such as the interest in the freehold of ground embanked from the river on Hebburn and Wallsend shores, the argument, therefore, being that the Corporation's interest in the soil had been to a large extent more in the nature of an accompaniment of

its Conservancy Powers than of an ordinary indefeasible freehold.

At the inquiry of the year 1833 into the affairs of the Municipal Corporation of Newcastle, before Messrs. Dwarris and Rumball, the Town Clerk said:—"The question of property in the soil of the bed of the river is one of considerable nicety. The claim of the owner of the land on each side *ad medium filum aque* does not apply to a navigable river. The title to the bed of a river where the tide flows is *prima facie* in the Crown; and it will be found in ancient records that the Corporation held the soil and bed of the Tyne, together with the town of Newcastle, in fee farm under the Crown. The title of the Crown, however, might be defeated by the exercise of an exclusive right of fishery, and other acts of ownership, by the proprietors of adjoining lands. In the case of the River Tyne, the owners of the adjoining lands have worked the mines on each side up to the mid-stream, and have for the most part exercised the right of fishery opposite their own shores."

At the same inquiry the Town Clerk again says, speaking of an application which had been made for leave to build a quay above bridge:—"That application was not complied with, solely because the River Jury reported that it could not be granted without injury to the river. No other motive ever influences

the Corporation to refuse any application for leave to build quays at Gateshead or any other place.”

In point of fact, embankments of land, whether in the time of the Conservancy of the Corporation of Newcastle or of the Tyne Commissioners, have been added to the lands and become the property of the adjoining proprietors. In the neighbouring River Tees the value of ground so reclaimed is divided, and the value thereof allotted in certain proportions to the Crown, to the adjoining proprietor, and to the Tees Conservancy Commissioners, under the authority of the Tees Conservancy Navigation Act.

Some very long and protracted legal proceedings took place in the seventeenth century between the Corporation and the lessees of the Dean and Chapter of Durham, as to the erection of ballast shores at Jarrow without the consent of the Corporation, in which the Conservancy jurisdiction of Newcastle was repeatedly affirmed. The proceedings in these cases involved many questions of right and privilege, as well as of common law, there being several trials on different issues in the reigns of Charles I. and Charles II. These proceedings, in connection with the fights with Gardner and other petitioners in the time of the Commonwealth, made the seventeenth century a particularly disturbed period on the Tyne.

The Corporation had not only old contests with the Bishops and ecclesiastical authorities of Durham, but had likewise, at various times, stout legal battles with the Priors of Tynemouth and other disturbers of corporate peace.

The old Burghers of Newcastle had to do fierce fights, not once, but oft and continually, in defence of their chartered rights and privileges. The town being in ancient times truly described as a shield and defence against the frequent insults and invasions of the Scots, involving thereby onerous and expensive obligations on the citizens, their privileges were vigorously contended for as the town's just right and due. As strongly were they protested against by others as being unjust and tyrannical. In the light of the present age it is curious to read the pleas of those old times; such as the plea of the Corporation in their action of the year 1290 against the Priors of Tynemouth and Durham for building towns "where no towns ought to be." The Corporation declare "that at the visit of John de Vallibus and his colleagues to the County of Northumberland, in the seventh year of the reign of our now King Edward, it was presented on oath that the Prior of Tynemouth had raised a town on the bank of the water of Tyne at Sheles on the one side of the water, and that the Prior of Durham had raised another on the other side of the water, where no town ought

to be, but only huts for sheltering fishermen; and that fishermen sold fish there which ought to be sold at Newcastle, to the great injury of the whole borough, and in detriment of the tolls of Our Lord the King at the Castle, because the fish and other merchandise on which Our Lord the King is wont to take toll, which are now sold in the above manner, ought to be sold at the borough of Newcastle, where Our Lord the King takes his tolls; and that the said Prior had also made a brewery at Sheles, and had large fishing craft where there ought to be only boats, whereby Our Lord the King lost his tolls and the borough of Newcastle its customs, to the great loss of Our Lord the King and of the borough aforesaid. And that the Prior of Durham, on the other side of the water of Tyne, had made a brewery and had ships where boats only ought to be; and that the aforesaid Prior of Tynemouth caused other people's bread to be baked in his proper oven, which ought only to have been baked at the borough of Newcastle, whereby the borough lost its furnage, amounting to fourpence in every quarter."

The decision in this case was against the Priors, and to the effect that no towns ought to be on the Tyne except only at Newcastle. During the contention the Prior had ineffectually pleaded a right of market at North Shields.

It is most probable that from this period, whatever had been before, say from the beginning of the fourteenth century, there has been a continued population, though for a long time sparse and small, on both sides of the river at Shields; but for ages Shields is described in old references as consisting of only a few huts or shielings for fishermen.

The rise of the Coal Trade, however, and the consequent increase in the size of vessels using the river, would cause the loading, storing, and repairing of vessels to be done nearer the sea. These and other circumstances led to a gradual relaxation of the prohibitory laws of Newcastle, notwithstanding the proceedings which we shall see took place in the days of Oliver Cromwell against Ralph Gardner. The salt works at South Shields were in existence in the thirteenth century, and in the seventeenth and eighteenth centuries these industries were most extensive at that place. The trades allied to the shipping interest for supplying ships' stores, the formation of repairing docks, the residences of seamen and pilots, and the other concomitants of a harbour town, would gradually be located. Then arose the shipowning and mercantile classes, with shipbuilding, manufactures, and ballast wharves, until North and South Shields gradually developed into the two great shipping and commercial towns of the present time. Up to about the middle of the last

century those towns were situated nearly wholly on the low ground taken from the river; but about that time houses and streets began to spring up on the higher ground, and a rapid expansion from thenceforth took place.

The towns grew and became famous for the amount of their shipping property, their mutual insurance clubs, and other characteristics of maritime enterprise, as well as for their manufactures of iron, chemicals, &c.

The manufacture of glass had been established as far back as the early part of the seventeenth century.

Mackenzie, in his "History of Northumberland," states that a pit engine formerly stood on the site of the late Theatre at the corner of Union Street, North Shields, and that one of the houses a little above the Wooden Bridge was built over the mouth of a pit. The owners of this colliery, not being permitted to load their coals at Shields, sent them in carts to Cullercoats, where they were shipped.

Measures contemplated in the time of the Commonwealth for the creation of North Shields into a market town, and for freedom of trade and manufactures, as well as to buy and sell merchandise without molestation, and to load and unload from carts into vessels at that place, were unfortunately not carried into effect, its commercial expansion continuing to be fettered and hindered by the exclusive rights of Newcastle.

The progress of South Shields was to some extent no doubt impeded by the leasehold tenure of the ground on which the town is built. Had this been otherwise, and had the fine natural site for docks in the Mill Dam been preserved and utilized, that town would have made even greater progress as a shipping and commercial community. These docks would have been of comparatively inexpensive construction, and, being situated in the very centre of the town, similar to the Hull docks, must have added greatly to the good natural position of South Shields.

To South Shields belongs the honour of being the birthplace of the lifeboat, which was for the first time and successfully used on the 30th January, 1790. Mr. Henry Greathead, of South Shields, was the designer and builder. Designs of a lifeboat had been immediately previous exhibited by Mr. Greathead and by Mr. William Wouldhave, also of South Shields, to a committee of gentlemen who had formed themselves into an association for getting a lifeboat to mitigate the disasters of the sea. As in the case of other valuable inventions, great controversy has taken place on the respective merits of Greathead's and Wouldhave's designs, and their claim to the honour of the invention.

In the year 1829 the North and South Shields Steam Ferry for carriages and passengers was established between the Market Place, South Shields, and

the New Quay, North Shields. The Direct Ferry for passengers began in 1847.

Various projects have been from time to time proposed for the erection of a bridge at a high level across the river from North to South Shields.

In 1848 Shields was constituted an independent port for Custom House purposes. In 1865 the port of Shields was divided, and North Shields and South Shields were created independent ports.

There are thus three Custom House ports on the Tyne. This separation of what is really one port causes considerable confusion and misapprehension as to the magnitude and importance of the trade of the Tyne, and it has been frequently proposed that there should be a union of the three ports under the name of the "Port of the Tyne." Under such a union each of the existing ports would retain all the facilities for the transaction of business which it at present possesses; but the aggregate figures of the united port would correctly exhibit to the nation and abroad the business transacted and official status of the Tyne. In the Annual Shipping Returns of the Board of Trade the three Tyne Ports are now grouped to show the aggregate commerce of the River Tyne.

The borough of Gateshead, as we have seen, is probably of an antiquity equal to that of Newcastle, and has doubtless had a continuous population down

from very early times of the Conquest. The borough was incorporated by Bishop Pudsey in the year 1164. The town, like Shields, had many contentions with its neighbours of Newcastle. In the year 1552, during the reign of King Edward VI., the town was annexed by Act of Parliament to Newcastle. This Act, however, was repealed in the first year of the reign of Queen Mary, when the borough was restored to the Bishopric. Gateshead is a very important manufacturing town, containing the huge establishments of the North-Eastern Railway Company, of Hawks, Crawshay, and Sons, of John Abbot and Co., the Newcastle Chemical Works, with those of Black, Hawthorn, and Co., Sowerby and Co., and many others. The rapid growth of the town in recent years in population, and its extension in all directions, is marvellous, exceeding that of either Newcastle or Shields.

In the year 1548 the population of Newcastle is assumed to have been, and to have continued for some time, at about 10,000. In 1770 Newcastle is estimated as having 24,000, and Gateshead 6,000, inhabitants. The populations of Newcastle, Gateshead, and North and South Shields, from the commencement of the present century, are given in one of the appendices to this work.

Not only have the four boroughs named increased so rapidly; but the increase outside and in the

neighbourhood of those boroughs has been equally great. The new borough of Jarrow has been created. The large communities of Hebburn, Felling, Blaydon, Walker, Wallsend, Howdon, and others, have expanded into incipient towns; and the whole of Tyneside, from Ryton to the sea, is covered with an active, industrious, and ever-increasing population, so much knit together as to form one whole community of half a million of people, all alike greatly dependent upon, and vitally interested in, the improvement and development of their common highway, the River Tyne.

In addition to the coal trade the principal industries carried on in the Tyne are of considerable antiquity; for instance, the lead trade. As we have shown, lead was an article of export from Newcastle in the reign of Henry I.

The smelting of iron is supposed to have been in operation in this district in the time of the Romans. Blast furnaces were in existence in Redesdale in the thirteenth century.

There were ironworks in the county of Durham in the early part of the seventeenth century. Sir Ambrose Crowley commenced his ironworks at Winlaton Mill about 1691. The Gateshead Ironworks of Hawks, Crawshay, and Son, were established in 1747. Several of the other great ironworks date from the early part of this century. The great

manufactories of locomotives and other machinery of course date from the appearance of the locomotive engine; and the famous Hydraulic Machinery Works of Sir W. G. Armstrong and Co. commenced about 1846; the Ordnance Works were later.

Sir W. G. Armstrong stated in his address, as President of the British Association, that the present railway gauge in universal use had its origin in the width of the space between the wheels of the coal carts for which railways were originally laid down in the Newcastle coal district.

The manufacture of glass is an old trade on the Tyne. Glass is thought to have been first used in Britain at the erection of the monasteries of Monkwearmouth and Jarrow in the seventh century. Crown Glass Works were established (supposed to be the first in England) by Sir Robert Mansell at Newcastle about the year 1616. In 1635 a royal proclamation gave the sole right of manufacturing glass on the Tyne to Sir Robert Mansell, and forbidding importation.

As before mentioned, salt works for extracting salt from sea water and from brine springs were formerly carried on most extensively at Shields, as also at Howdon Pans, Jarrow, and other places.

The first alkali works were those of William Losh and Partners, established at Walker in 1796. This important trade speedily made a home on the Tyne;

year 1709 for powers to enable the Tyne to be made navigable to Hexham, the Corporation of Newcastle opposing the measure as calculated to injure their port.

Similar projects were promoted in 1795, as part of a larger scheme for water communication between the German and Irish seas; and in 1796 another parliamentary application was made for leave to form a canal from Newburn to Haydon Bridge on the north side of the river, which was opposed and rejected by the House of Commons. A rival project for a canal between the same places on the south side of the river had been strongly recommended.

Several other schemes of a like nature were agitated early in this century. However, the scheme of an iron railway having been broached, the competing merits of rail and canal communication were for many years discussed, ending in the victory of the rail; and in the year 1829 the movement for canal communication was superseded by the passing of the Act for the construction of the Newcastle and Carlisle Railway, which railway was finally opened throughout for traffic between the two towns on 18th June, 1838.

Before closing this preliminary and rather desultory chapter, the existence and functions of the well-known corporate body of the Newcastle Trinity House should be alluded to. Of very old founda-

tion, and intimately identified for centuries with the trade and navigation of the Tyne, its influence has on many occasions been usefully exerted, and able men belonging to it have been justly of importance and weight in river matters.

The earliest reference to the existence of the Trinity House of Newcastle appears to be in 1492, the house at that date being a corporate body by the name of the "Guild" or Fraternity of the Blessed Trinity of Newcastle-upon-Tyne.

This body of ancient mariners doubtless had its origin like similar institutions in purposes of mutual self-help and charity, as well as for the promotion of the art of navigation. Being composed of competent nautical men, it grew into importance, and had public duties and functions successively accorded to it.

The house obtained a charter of incorporation from King Henry VIII. in 1536, which was confirmed by Edward VI. in 1548, and by Queen Mary in 1553. Queen Elizabeth, by charter in 1584, re-founded the Society. The house had also charters from Charles II. and from James II., the latter, dated 1687, being the governing charter.

Dues called primage dues were authorised for the purpose of maintaining buoys, lights, and beacons; also pilotage dues and the power of appointing and regulating pilots were conferred, the jurisdic-

tion of the house extending to Blyth, Sunderland, Hartlepool, Whitby, and Staithes.

The charter of Henry VIII. gave license to build and embattle two towers, one at the entrance of the haven of Tyne, and the other on a hill adjoining, in each of which a light was to be maintained every night as leading lights into the harbour.

In the year 1801 an Act of Parliament was obtained for extending and enlarging the powers and increasing the rates and duties of the Corporation of the Trinity House. The present lighthouses at North Shields were afterwards erected and completed in 1810.

The Trinity dues levied seem always to have been largely in excess of what was required to discharge the public duties imposed upon the brethren, and the amounts so obtained must have been considerable during the long period this fraternity were in possession of their full privileges, after allowing the cost of their well-known charitable and hospitable outlay. The house, though now greatly denuded of its ancient powers, is still a wealthy corporation, retaining its control of the lights and buoys, and in possession of extensive properties and invested funds. Its powers, as to pilotage, were taken away by the Tyne Pilotage Order Confirmation Act, 1864, and vested in the present Tyne Pilotage Commissioners, a representative body, of which the members

are appointed by the Tyne Improvement Commissioners, the shipowners of Newcastle and North and South Shields, the Trinity House, the Board of Trade, and the licensed pilots of the Tyne. Sunderland and Hartlepool have also secured the jurisdiction of the pilots in their respective ports under similar representative bodies.

The hall, chapel, offices, residences for the pensioners, and other buildings connected therewith in Newcastle, the foundation of which dates as far back as 1505, are highly interesting, and the books of the house abound in entries which recall past periods of history; for instance, the troubled times of the Great Rebellion are vividly brought before us in two entries of the years 1644 and 1645, being cash paid to a schoolmaster for engrossing on parchment the "solemn league and covenant," and a "gratuitie of one pound ten shillings paid to Dr. Jennison when he preached in Trinity House Chapel, and administered the covenant." Seeing, however, that during these years the Scottish armies of the Parliament were in possession of the town, it may be concluded that the religious zeal of the Trinity House was not entirely voluntary.

Having thus taken a rapid retrospective glance at the Tyne in the past, and a short view of the rise of some of its important trades, we shall now proceed to the more immediate object in view, and

detail the history of the Conservancy and Improvement of this important river. The subject is not by any means a popular one, but it is thought desirable that the present generation should have placed on record the struggles which have agitated Tyneside on the long debated subject of the Conservancy, which became finally vested in the Tyne Commissioners; and also to show how the Commission, in the course of a comparatively short period, has fulfilled its mission, and raised the Tyne from being a shallow stream, dangerous and intricate of navigation to the vessels of modern days, into a stately and deep river, capable of accommodating the largest vessels afloat almost at all times of tide—a river, with its deep-water dock and other appliances, scarcely, if at all, surpassed by any of the great ports of the nation for carrying on a vast and expanding commerce.

THE RIVER UNDER THE MANAGEMENT OF THE OLD
CORPORATION OF NEWCASTLE.

The Conservatorship of the River Tyne, throughout the extent of its tidal flow, from a point in the sea called Spar Hawk, ten miles below Newcastle, to Hedwin Streams, anciently called seven miles above Newcastle, had, as we have seen, from time immemorial been vested in the Corporation of Newcastle, as evidenced by charter and prescription.

The Port and Haven of Tyne, along with the town of Newcastle-upon-Tyne, was held by the Corporation in fee farm under the Crown, and had been so held from beyond the date of legal memory, which is defined to be the period of the return of King Richard from the Holy Land.

A number of ancient charters and prescriptive usages of long standing were invariably adduced on the part of the Corporation, on any occasion of interference with, or question of, their ancient rights and privileges. The first charter quoted appears to be one of Henry II., which is said to recognize their title and confirm it, describing the rent which had been and was then paid as an ancient rent. Then there was a charter of King John, in 1213, whereby

he grants and confirms to the honest men of Newcastle and their heirs his town of Newcastle, with its appurtenances in fee farm at £100 per annum. This charter is confirmed by King Henry III. in 1234. Edward III., in the thirty-first year of his reign, also confirms previous charters and confers further privileges; as does Richard II. in 1378, and Henry IV. in 1400. In 1423 King Henry VI. grants certain customs to be taken of every ship in the port, and in 1444 confirms the old charters and liberties. The same monarch in 1454 granted the conservatorship of the river from Spar Hawk to Hedwin Streams to the town of Newcastle-upon-Tyne. The former charters are also confirmed by Richard III. in 1483, and by Henry VII. in 1485. There is also a charter of Henry VIII. in 1510, and an Act passed in 1530, whereby the landing of goods at any other part of the Tyne than at the Quay of Newcastle-upon-Tyne was prohibited. Edward VI. in 1548, and Queen Mary in 1554, likewise confirm previous grants.

Queen Elizabeth also, in 1589, confirms previous grants to the Corporation, with Admiralty jurisdiction. As regards the town of Newcastle, it is to stand, as well in breadth as in length, as well by land as by water, as was accustomed from the memory of man, extending in the River of Tyne from a place called Spar Hawk in the sea to

Hedwin Streams. The same Queen also granted in 1600 what is called the Great Charter.

These grants of the town and port, and others not here recited, in confirmation and extension or variations of the same to the Corporation, as well as inquisitions and findings in support of the Conservancy powers, seem to be continuous with few breaks. It is recorded that, in the year 1613, King James I. granted the Conservancy of the River to the Mayor and Burgesses of Newcastle, jointly with the Bishop of Durham and other Justices of the Peace for Durham and Northumberland. Again, in 1617, under the same monarch, seventeen new Commissioners were appointed, among whom was the Mayor of Newcastle, for the better conservation of the River Tyne. However, we find that in the year 1630 the old prescription for the conservation of the River Tyne by the Mayor and Burgesses of Newcastle was allowed both in the Court of King's Bench and the Exchequer.

Having recited these various charters and grants, it is but right to state, as has already been alluded to, that there were other charters and grants and confirmations thereof by various monarchs, to the Bishops of Durham, giving powers over the one-third of the river adjacent to the Durham shore, which seem inconsistent with the extensive powers possessed by the Corporation; but, as stated, when-

ever the points were raised, as affecting the Conservancy, the jurisdiction of the Corporation was ultimately affirmed.

In the time of the Lord Protector, Oliver Cromwell, a petition was presented to Parliament by Ralph Gardner, of Chirton, Gentleman, on behalf of himself and many others, complaining of heavy oppression and injustice on the part of the Corporation and grievous neglect of the river, and praying, amongst other things, "that the trust of the River Tyne be put into faithful Commissioners' hands, the Mayor and Aldermen and Commissioners of Newcastle having betrayed the trust reposed in them for conservancy thereof, and that the charter granted to the Corporation may be called in and viewed;" which petition was ordered by the Council of State to be taken into consideration, and a copy thereof was on request supplied to the Corporation.

The Corporation, in their Plea and Defence, set forth their claim to the fee farm of the ancient town and port; stating that they had had the conservancy of the said river belonging to them by prescription time out of mind; and plead not guilty as to all and singular the crimes, oppression, breach of trust, misdemeanors, and offences suggested and alleged against them. They further say that by the care and government of the said Conservators the river and port is preserved, when others, for the want of

like care, are spoiled and made almost unserviceable. Various and protracted proceedings took place before the Privy Council in the matter of Gardner's petition. A long array of witnesses were produced, who gave instances of the alleged iniquities practised under cover of the Corporation's charter law, and of the tyranny exercised by the Newcastle authorities; of the inconvenience and obstruction to trade, and loss of life, occasioned by forcibly compelling all vessels to come up to Newcastle; and of other unbearable evils. These proceedings extended over a considerable period. There is some uncertainty whether the want of funds on the part of Gardner to prosecute the petition did not cause its prayer to fall through; but it is more probable that the failure was owing to the dissolution of Parliament by Cromwell in 1653. From whatever cause, however, the business did stop, leaving the Corporation as usual in full possession of their ancient rights and privileges.

The time of the Protectorate was especially a stormy period for monopoly and privilege. With the Monarchy itself in the dust, the tenure of power under kingly grants and charters was peculiarly frail; and there appears to be little doubt that in 1653 the River Conservancy and exclusive privileges of Newcastle were in imminent peril. It should be stated that, throughout the reigns of James I. and

Charles I., during the time of the Civil War and Protectorate, and until the Restoration in 1660, numerous attempts, by petitions, remonstrances, and even by armed resistance to the authorities, were strenuously, if unsuccessfully, made to destroy the controlling power of Newcastle over the Tyne.

The details of the charges of Gardner, and the Corporation's reply thereto, are given at great length in Gardner's "England's Grievance in Relation to the Coal Trade." (Edition 1849.)

From the same source is taken the following copy of an Act for Free Trade, which is said to have been drawn up by order of, and intended to have been submitted by, the Government to Parliament, if the Parliament had continued :—

HIS EXCELLENCIE, OLIVER CROMWELL,

GENERAL OF ALL THE FORCES OF ENGLAND, SCOTLAND, AND IRELAND,
CHANCELLOR OF THE UNIVERSITY OF OXFORD, LORD PROTECTOR
OF ENGLAND, SCOTLAND, AND IRELAND.

AN ACT FOR A FREE-TRADE IN THE RIVER OF TINE,
FOR COALS, SALT, &c.

(A) WHEREAS trade and commerce is become now, more than formerly, the interest of this nation, and it is therefore the duty as well as the wisdom of this parliament to secure and advance the same, and in order thereunto, and for other great ends of honour and safety, to increase the shipping, and encourage navigation ; and whereas a great part of the stock and wealth of this nation lyes in the well husbanding and managing of those home commodities of coals and salt,

milstones, glasse, the chief trade whereof is exercised upon the river of Tine, and in the county of Northumberland and Durham.

- (B) And whereas the parliament hath been informed of great exorbitances done and committed by the town and corporation of Newcastle, upon pretence and colour of powers, priviledges, and franchises, granted to the said corporation, whereby it appears :
- (C) That the free and quick trade of those staple commodities hath been much obstructed, the river made dangerous, and in many places almost un-navigable, and encrease of shipping, so considerable a nurcery of marriners, greatly ruined, and navigation too much discouraged ; for remedy herein,
- (D) Be it enacted, declared, and ordained, by this present parliament and by the authority thereof, that all former powers, priviledges and grants, made and granted to the town and corporation of Newcastle, or to any other person or persons whatsoever, for the conservancy of the river of Tine, be and are hereby repealed, made void, and null, and the committee of the admiralty, by the authority of parliament, or any five of them, be and are hereby authorised and required to nominate and appoint fit and able persons, as well of the counties of Northumberland and Durham, sea-coast, and port of London, as of the town and corporation of Newcastle, to have the charge of, and to be conservators of the river of Tine, and to invest and impower the said persons, with all priviledges and power necessary to enable them for the better and more effectual carrying on and performance of the said service.
- (E) And the said commissioners are hereby further impowred and enabled from time to time, to give and prescribe unto the said conservators, rules and instructions for to observe and pursue, and to require obedience thereunto, and to receive and examine complaints, and to hear witnesses upon oath, (which

oath they, the commissioners, or any three of them, are hereby enabled to administer,) and to punish offenders by reasonable fine, and punishment by imprisonment, and to displace and remove conservators upon just and reasonable cause; and to lessen, or adde to their number, as they shall see cause, and to direct and order all other matters requisite, and necessary, for the conservancy of so famous and commodious a river, and for preventing all such damages, mischiefs, and newssances, as may hurt or ruine the same, and to settle a stipend upon the said conservators, and to direct the same, and other necessaries, and incident charges, to be allowed, and issue out of the profits of the said river.

- (F) And be it further enacted, and ordained, that sufficient and well-fenced ballast-shoars, keys, and steaths, be built and erected, either at Shields, or such other convenient place, as the said conservators, or the major part of them, shall think fitting; and the said conservators are authorised and required to use and direct, all good wayes and meaus, according to such powers and directions, as they shall from time to time receive from the said commissioners of the admiralty, to prevent and remedy all damages that may happen, by losse of ships, and men's lives at sea, by casting their ballast overboard, or into the river, at unseasonable times, or unfitting places, or from the ballast-shoars being carelessly kept, through great winds, rains, or other casualties, washing down the ballast, and that from henceforth, no masters of any ships, or other vessels, be constrained to go up the river, and to heave out their ballast at the shoars belonging to the town of Newcastle, or be hindred to load coals, or discharge their ballast, where they may, with most conveniency and safety, perform it, as well to the roadsteads itself, as to their shipping.
- (G) And further, that all masters of ships trading to the said river of Tine, have hereby liberty and power, to make use within

the said river, of what ship-carpenter or ship-wright, or other artificers, or persons they please, and find fittest for their own conveniency, in times of distresse and necessity.

- (H) And of what able sea-men they shall think fit, for pilots.
- (I) And have hereby liberty to buy, or take in, at any place of the said port or river, bread, and beer, and other necessaries, for their own spending and victualling.
- (K) And that all goods and provisions, which come in by sea, for the use of the salt works, colleries, and other buildings, at or near the Shields, may be delivered at the Shields, course being taken for paying and satisfying all duties, payable for the said goods and provisions.
- (L) And all persons who are willing, are hereby encouraged, and have liberty, to build ships and vessels, on the said river, for the encrease of trade and navigation.
- (M) And that all this be done without any fine, imprisonment, confiscation, or other molestation of any person, vessell, or goods, for or in reference to any of the premises, any law, usage, practice, custome, privilege, grant, charter, or other pretence whatsoever, to the contrary, notwithstanding : Provided alwayes,
- (N) And it is hereby enacted, that no ship, or vessell whatsoever, that shall bring in any kind of merchandize, or grain for the proper use of the town of Newcastle, usually coming to the said town of Newcastle, and places adjacent, beyond, shall deliver, or land the same, or any part thereof, at any other place, within the said harbour or port, but at the said town, or, as near to it as formerly have been accustomed.
- (O) And to the end so useful a commodity, as that of sea-coal, wherein the poor of this commonwealth are so principally concerned, may come cheaper to the market, and that coal-owners may not be in a worse condition, then the rest of the free people of this nation,

Be it enacted and ordained, that the said coal-owners, in the respective counties, adjacent to that river, may, and have hereby liberty, to let leases of their coal-pits, and to sell their coals to whom they please, as well to ships, as elsewhere, for benefit of the public, though they be not free of that corporation of Newcastle, due course being taken for securing, paying, and satisfying to the state, all duties payable thereupon.

And be it further enacted, that North Shields, in the county of Northumberland, be made a market town, two dayes in the week, to be holden on Munday and Thursday, for the relief of the country, the garrison of Tinemouth castle, the great confluence of people, and fleets of ships, and that the commissioners of the great seal, be hereby authorized, to issue out such powers as are requisite, and usually doue, to other markets in the commonwealth.

THIS IS A COPY OF WHAT WAS TO HAVE PASSED, AFTER DEBATE,
IF THE PARLIAMENT HAD CONTINUED, ETC., APPOINTED TO
BE DRAWN UP BY ORDER.

About the year 1800, an abortive attempt was made towards the constitution of a Commission of Conservancy in place of the Corporation, notices having been given in the three previous years by the shipowners of Shields of their intention to introduce a Bill to this effect.

In connection with the conservancy of the river, the Corporation had levied, by virtue of these charters, or some of them, or by prescriptive right, certain dues on the export and import of coal and other merchandise, and some dues on shipping called "ship and boat dues," and "groundage and plankage

dues," with the profit derived from the exclusive right to unship and dispose of all ballast brought into the port. These dues were received by the Corporation and expended along with their other corporate revenues, the result being that a large annual amount derived from the commerce of the Tyne was expended upon purely town purposes.

Upon this point, and before leaving the ancient charters, it seems quite clear that these river dues were applicable in the first instance, if not to the improvement, at any rate to the maintenance of the river from which they were derived. This the Corporation always admitted. In their reply to some proceedings on a *quo warranto* brought against the Corporation in the time of Charles I., it is alleged as follows, and this is quoted as being a very clear description by the Corporation at that time of their title to and duties owing to the river :—

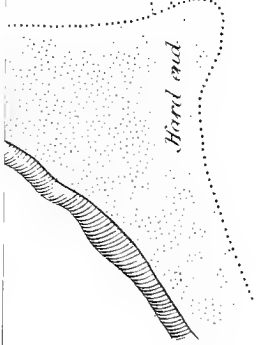
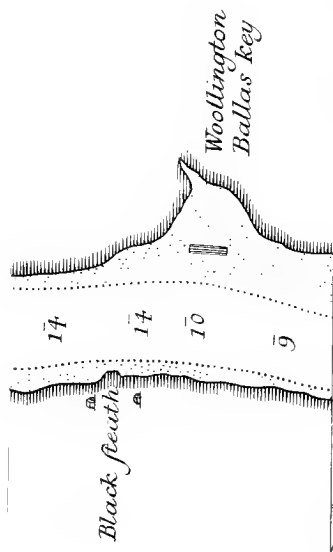
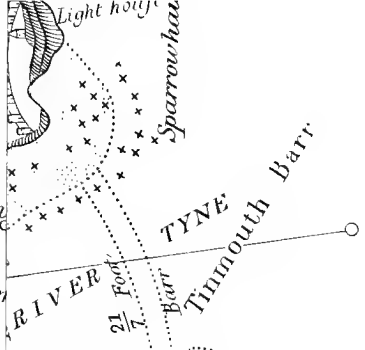
That the Mayor and Burgesses hold, and have held beyond the memory of man, of the King and his progenitors, the town of Newcastle-upon-Tyne, with the haven and water of Tyne, and the ground or bottom of the said water covered with the flowing of the sea, and being within the flood-mark from the place called Spar Hawk in the sea to the aforesaid place called Heddon Streams, and that they are parcell with the appurtenances and liberties and free customs of the same town, at the fee farm of one hundred pounds : And that the aforesaid Mayor and Burgesses are, and, from the time of the contrary whereof it is not in the memory of man, have been conservators of the water and haven aforesaid, "for

the scouring and cleansing the aforesaid haven from ballast, gravel, sand, rubbish, mudd, and other dirt and filth brought and driven by the sea and tempests, or otherwise cast, thrown, or falling into the aforesaid haven, and for the preservation of the aforesaid haven, and to keep and preserve the same a safe station or harbour for ships, *and that the ships applying or coming to that haven, or going out of the same, may come in and go out safe and without danger.*”

The Corporation considered that their duty, as thus described, was fully discharged by keeping the river in as good a state as it was wont to be—that is, preventing it getting worse.

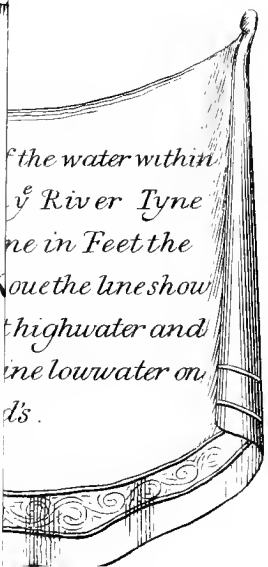
Amongst the earliest authentic charts of the river now in existence the principal are:—(1) A chart by Captain Collins, hydrographer to the King—date of publication, 1723—(George I.), but founded on a survey made much earlier, addressed to the Trinity House of Newcastle-upon-Tyne, showed the depth of water on the bar at low water spring tides to be seven feet, and twenty-one feet at high water. The plan also showed much lesser depths between the bar and Newcastle. A copy of the plan is given. (2) A plan of the River Tyne, from Tynmouth Barr to Heddon Streams, from an accurate survey, finished in 1782, by John Fryer, mathematician, Newcastle, which likewise showed the lowest depth of water on the bar at low water to be seven feet, with much diminished depths in many places in the channel up to Newcastle. There are several other charts for portions

"Great Britains Coastline
 by "Cap^t Paul Jones"
 possession of the Tyne In

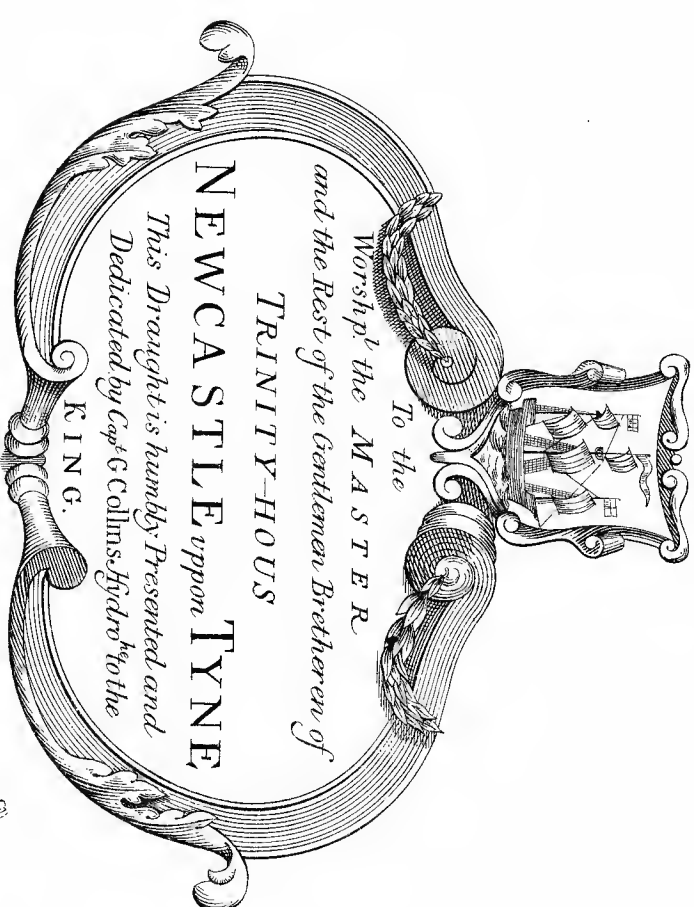
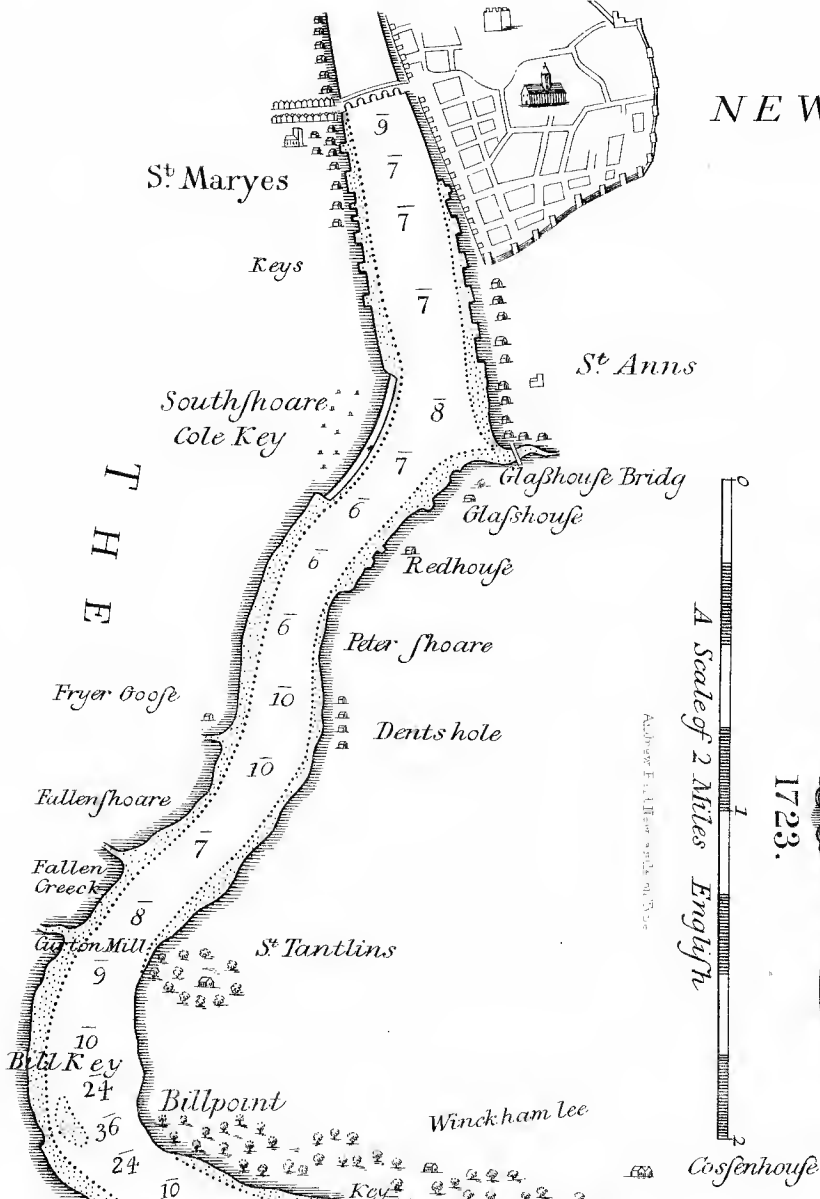


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NEWCASTLE

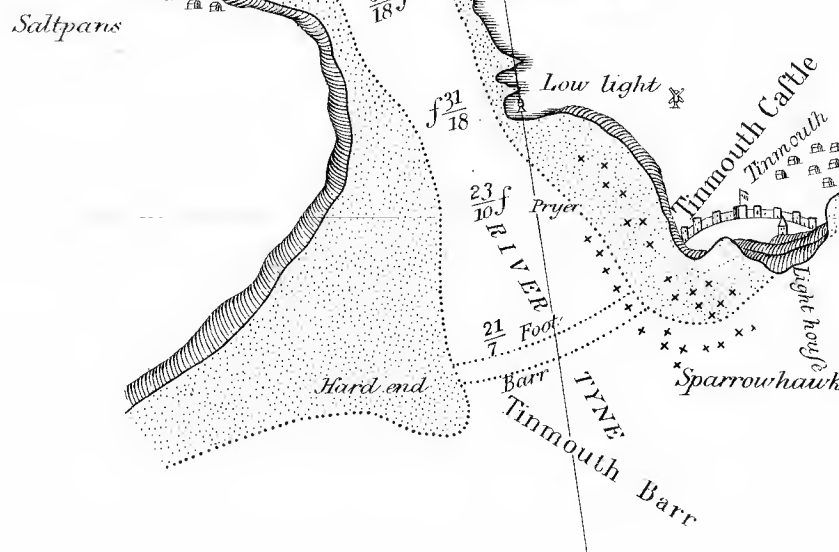


THE
 BISHOP
 OF
 DURHAM

Note—From "Great Britains Coasting Pilot MDCCXXIII (1723)"
 signed by "Cap^t Paul Jones" Bon Homme Richard 1779"
 in the possession of the Tyne Improvement Commissioners.



South Sheelds



of the river (principally by Fryer) between the dates of Collins' and Fryer's surveys just named, all showing a little greater depth on the bar than at the date of Rennie's survey, to be hereafter mentioned.

From the time of Gardner downwards, one continued string of complaints continued to be made of the alleged shoaling and deterioration of the river.

Captain Phipps, a man of great knowledge in nautical matters, who was a candidate for the representation of the town in 1774, and who shortly afterwards became Lord Mulgrave, said he considered the River Tyne capable of becoming one of the finest rivers in the world, but ignorance, inattention, and avarice had converted it into a "cursed horse-pond."

It was charged as a special grievance against the Corporation, that their wasteful and extravagant mode of dealing with the ballast brought into the port, and the heavy rates charged caused vessels to discharge ballast at sea in positions where it was liable to be washed on to the sands at the mouth of the river, or into the river itself; also that the ballast put on shore by the Corporation, by carelessness and want of proper precaution found its way again into the river, and that large quantities were deliberately thrown into the river by vessels. About 1760 a Mr. Liddell had propounded a plan for taking out ships' ballast and depositing it at sea in positions where it

would not wash into the harbour. Many shipowners and captains trading to the Tyne petitioned the Corporation in favour of its adoption, which the Council, however, declined to do. Demands were made that the Conservancy should adopt some mechanical mode of cleansing the river such as was being done in the Clyde.

About the year 1802 Mr. Chapman, a civil engineer, propounded a plan for removing the Insand and Middle Ground, two of the greatest obstructions in the harbour, but the plan was not entertained by the Corporation.

Few if any steps were taken with a view to improvement or bettering of the river, with the exception of the removal, about 1790, of some projecting rock and stones abreast of the Black Middens, until the year 1813, when the Corporation engaged the services of the then eminent river engineer, Mr. Rennie, to report upon the capabilities of the Tyne for improvement.

In the year 1800 the Corporation were indicted for obstructing His Majesty's highway by the incumbrances of the "Dortwick Sand," the "Middle Ground," the "In-sand," and the "long reach." This indictment was tried at a special jury at the Northumberland Assizes, when the Corporation were acquitted. Mr. Fryer, who had been previously employed by a committee of shipowners to make

a survey of the river from the bar to Whitehill Point, to show the Conservators how bad it was, in a letter addressed to the Town Clerk at the time of this trial, says, that then (1800), from Whitehill Point upwards, to Jarrow Quay, Howdon Pans, and Willington Quay, "there were many large sands grown up, and the navigation worse than ever he saw it before. In some parts there was not water enough, when the tide was out, to cross in a sculler."

For the purposes of Mr. Rennie's report, elaborate soundings, observations of the tidal and other phenomena of the river were taken under that gentleman's direction by an accomplished surveyor, Mr. Francis Giles, upon which an accurate plan was prepared, revealing for the first time the real state of the river, and becoming a standard to which future surveys and projected improvements could be referred.

Mr. Rennie, in his report dated 1816, commences by saying that there is perhaps no river in Great Britain on which it is more difficult to give an opinion as to the best mode of improving its navigation than the Tyne, where not only is great depth wanted, but great width to accommodate its enormous trade. He recommended for the section between Shields and Newcastle the narrowing of the river in some parts and widening it at other parts by the removal of obstructing points, with a view of

giving a truer direction to the tide, and securing better scouring power. For the improvement of the entrance he designed a pier on the south side of the river; for the whole of Shields and the most of Newcastle the contraction was to be made by regular wharf walls of masonry. The approximate cost of these works he estimated at £519,320.

Mr. Rennie's chart showed a depth of water on the bar of six feet at low water, and a minimum depth in the sailing channel of four feet up to Newcastle. Numerous sandbanks, eddies, shoals, and projecting points obstructed the free ingress and regress of the tide, the river being decidedly worse than it was at the date of Collins' survey.

The execution of Mr. Rennie's plans involved a very considerable narrowing of the river, and, unless a corresponding deepening in the bed and lowering of the low water surface took place, a great quantity of tidal water would be excluded, which the men of the old river jury and other nautical authorities thought would be highly detrimental to the river. The removal of Whitehill Point was objected to, first on the part of the owner of the soil, and afterwards by the town of South Shields. Various obstacles, the Corporation allege, presented themselves in the way of every individual method recommended, whilst the benefit to be derived was problematical. Whether from this cause or from others, no steps were taken by

the old Corporation to carry out Rennie's recommendations, except the removal of a shoal at Friars Goose, which was done about the year 1832.

In the year 1833 the investigation into the Municipal Corporation of Newcastle was made before F. Dwarris and S. A. Rumball, Esqrs., two of His Majesty's Commissioners for inquiring into Municipal Corporations. At this investigation the shipowners of North Shields, the coalowners, and the town of Gateshead, by their representatives made strong protest against the monopoly of Newcastle, the neglect of the best interests of the port, and the abstraction of the river dues to corporate and town purposes. Several Free Burgesses, also, of the town complained of neglect of the Corporation in not using the necessary means for the removal of shoals and obstructions, and spending too much river money on purely town purposes. Some of the witnesses stated the river to be worse than formerly, and urged the Corporation, with their ample funds, to make it what nature intended it to be—one of the best rivers in the kingdom. To all the various accusations the Town Clerk, who so ably represented the Corporation, could only reply "that the river had not become worse," and appeal to the difficulties besetting the execution of any improvement. In the year 1832 an able letter had been addressed to the merchants, coalowners, and ship-

owners of Newcastle, by Mr. John Macgregor, surgeon in the Royal Artillery, on the deplorable state of the Tyne, and urging those interested to take up the question of its improvement with becoming zeal, intrepidity, and perseverance.

A report or letter from Mr. Joshua Richardson, C.E., dated 13th August, 1834, addressed to a joint committee of the Town Council and the Newcastle Chamber of Commerce, is published, in which a general assent is given to Rennie's plan, although there are parts of it from which, in Mr. Richardson's opinion, the accruing benefit would be very problematical; as, for instance, Rennie's mode of building the quay walls, and the erection of a pier at Shields.

No results followed from these and other appeals; and the *regime* of the old Corporation of Newcastle closed before the era of improvement had commenced.

The Corporation for centuries had indisputably the control of the river funds, receiving and using for the use of the town and port large annual revenues derived from the river; and these funds, or some portion of them, would have been better spent on the river than carried into the coffers of the town. Many causes, however, were in operation to prevent river works being then undertaken. The capabilities of the river in its unimproved state—a "Natural Dock," as it was called—were great for

the class of vessels then in use ; and the pressing necessity for enlarged harbour facilities to meet the requirements of modern commerce, and withstand the competition of other ports was, apparently, not sufficiently felt. There seems, likewise, to have been a total disbelief in the practicability of artificial works of improvement, and a great fear that the town's revenue would be uselessly squandered in embarking on such an enterprise. Indeed, many nautical men, entitled to speak on the subject, strongly asserted that engineers, less wise than nature, would simply spoil the Tyne. These and other reasons appear to have caused the Corporation to ignore the river and its capabilities of improvement, as well as those signs of progress which were even then being manifested all around. The new port of Seaham had been called into existence. Sunderland was making strides on its way to become the great port it now is. The Clyde was being deepened by the application of steam dredging ; and other significant circumstances of a like nature were to be seen throughout the kingdom ; but the lordly Tyne was slow to move.

UNDER THE MANAGEMENT OF THE REFORMED
CORPORATION OF NEWCASTLE.

The new Town Council, elected under the Municipal Corporations Reform Act, came into office in January, 1836; and a desire for some improvement in the river soon manifested itself amongst the members. The Council comprised several intelligent, able, and earnest men, whom the Reform Act had introduced into the Corporation, and it would have been strange had a more active and progressive spirit not displayed itself in action with regard to so vital a matter as the proper conservation of the Tyne. A resident river engineer, Mr. Anderson, was appointed. Mr. Anderson's efforts seem to have been wisely directed, so far as the resources at his command permitted. In his reports he recommended dredging and other works with a view of concentrating the ebb and flow of the river on the sands and shoals which obstructed the navigation.

In the year 1836 a most interesting paper of observations on the influence of Jarrow Slake on the tides in the Tyne was read before the members of the Newcastle Literary and Philosophical Society by Mr. Macgregor, in which he advocated the en-

closure of the slake from the river for shipping and commercial purposes.

In the same year, some observations on the improvement of the navigation, by the late Alderman William Armstrong, were published, in which he combats some of Macgregor's arguments as to the enclosure of Jarrow Slake, and expresses generally a want of belief in the different modes suggested for obtaining an artificial depth of water in the Tyne.

In the year 1837 there was issued the prospectus and plan of a dock proposed to be constructed in or near Jarrow Slake. The provisional committee comprised the names of the Mayor of Newcastle and most of the then leading gentlemen of Newcastle, Shields, and the district. Mr. Harrison, C.E., was the engineer, and Mr. Cubitt, C.E., consulting engineer, Messrs. Claytons and Dunn, solicitors. The estimated capital was £200,000.

In 1846 the York and Newcastle Railway Company obtained powers for the construction of a dock on Jarrow Slake, and the works were let to a contractor and partially proceeded with, but soon abandoned, principally, it is thought, under the influence of the great commercial depression which commenced in 1847.

As considerable weight of nautical authority continued to be ranged against Rennie's recommendations, the Council called in the services of Mr.

Cubitt, C.E., to advise them, who, in his report of 1837, approved generally of Rennie's lines of improvement. At the request of the Corporation he gave plans and estimates of cost for an extension of Newcastle quay. He also estimated the cost of wharfage for large vessels at Dent's Hole. For the general improvement of the river channel he recommended the groining of the great bends or slakes on either side, according to the line laid down on Mr. Rennie's plan, or such modification thereof as circumstances might render advisable—dredging out a channel between those lines, depositing the soil on the shores of those parts of the river taken off by the groins, and the securing the new banks or shores with stone rubble, to enable the improved channel to be maintained after dredging to the requisite depth when the sides of the river were brought to their proper height and form; the first thing to be done being the groining of the large bend extending from Hoyle's copperas works to a little below Wallsend coal spouts, which area, he says, may with propriety be called "Wallsend Slake;" the dredged material and ships' ballast to be deposited between the groins, which, with the natural silt, he anticipated would in a short time bring the enclosed space of 60 acres up to high water mark, and cause the "Cockrow Sands" to disappear. He suggests an annual expenditure of £10,000 on this process of deepening the channel.

The Corporation proceeded with the construction of the quay at Newcastle and the jetties at Wallsend and other places, also cut down the high bank on the north side of the river at Bill Point, and the first dredger was set to work.

In 1842 Mr. W. A. Brooks was appointed river engineer; and in a report dated December of that year he recommends certain modifications of Rennie's lines—the construction of various groins or jetties at stated parts to scour away the shoals and depress the low water surface of the river, at a cost of £17,000, anticipating that the result of their construction, and of this expenditure, would be to enable vessels of 17 feet draught of water to reach with facility the quay at Newcastle in ordinary spring tides. The report did not contemplate the necessity of dredging.

These works were proceeded with: jetties were constructed transversely to the water way, river walls were made in front of the places enclosed and ballast thrown in, apparently in the expectation that the river thus confined would act as its own dredger, and scour a deeper channel.

The works undertaken unfortunately were not component parts of one well-conceived and comprehensive design, but were of a fitful and partial character. As dredging power was not applied in any way competent to contend with the accumulated mass of sandbanks and obstructions, the one single dredger

was employed in clearing places here and there, to be speedily filled up again by the natural action of the stream. Large quantities of land were embanked from the river without obtaining a corresponding depression of the low water surface; sand was scoured away at the end of the jetties to be deposited again where the scouring action of such jetties ceased, and other measures of a partial and unefficacious nature were carried out; the river in the meantime really deteriorating, and the demands for an improved state of things constantly increasing.

Mr. Brooks was of a most energetic and active nature, and during this period applied his utmost efforts in the work of improvement.

No large and comprehensive practicable scheme of river improvement was either conceived or adopted. Many able and intelligent men, besides engineers, had written, deploring the bad state of the river compared with what it could be made, and recommending partial or general remedies. The members of the River Committee, in their proceedings, were unquestionably actuated by a sincere desire for a better state of things; but they laboured under great disadvantages. They were merely a committee of a larger body—the Town Council—which had a great deal of other town business to transact. The Town Council looked on the river revenues equally with the town revenues as part of the town pro-

perty. The competing claims of Town Improvement Committee and River Improvement Committee were ever before the Council. With the large number of fifty-six gentlemen elected by the town to decide on these points; with no voice from the other towns on the river, or representation either of nautical or trading interests, it was not to be expected that the river would receive sufficient attention. These influences, together with the fact of the great majority of the Council feeling reluctant and unbelieving as to the practicability and success of any scheme of improvement, were more than sufficient to strangle the efforts of a few clear-sighted men, and to doom to failure at their birth the puny and imperfect measures which were undertaken.

All the time, labour, and money, bestowed by the Corporation during this period, may be said to have been almost barren of beneficial results, except in so far as practical experience was being gained of the real requisites of river improvement.

In consequence of pressing demands from the shipowners of the port in 1845, the Newcastle-upon-Tyne Port Act was passed, which provided for the establishment and maintenance of a river police and for the laying down of moorings for vessels, the expenses thereof to be met by a tonnage rate of one farthing per ton on all vessels using the port. A

River Watch Committee was authorised to be appointed, composed of members of the Corporation, and of members to be appointed by the shipowners of the port, for the purpose of carrying the Act into effect. The shipowners had contended that the expenses should be defrayed out of the corporate funds, but rather than not have the police and the moorings they unwillingly consented to the taxation imposed by the above-named Act.

THE CONSERVANCY CONTEST OF 1849-50.

Steps had been originated in the years 1840 and 1842, at both Gateshead and Shields, with a view to obtaining a Commission of Conservancy for the river; and these preliminary measures at length assumed a definite and active shape by the introduction into Parliament, in the session of 1849, of the Tyne Conservancy Bill, which proposed to take the conservancy of the river out of the hands of the Corporation and entrust it to Commissioners to be elected as proposed by the Bill. It also proposed to take from the Corporation the coal dues, ballast dues, and other river receipts, and vest the same in the new Commissioners as a fund for the improvement of the river.

The introduction of this important Bill resulted in a fierce conflict, lasting over two sessions of Parliament, between the Corporation and their opponents, during which time a vast amount of excited public feeling was aroused on both sides, and no end of literary, legal, nautical, and engineering skill and energy was marshalled by the two sides in support of their respective views.

To avoid undue prolixity, or any show of partiality in describing this contest, it will be well to give

merely the outline of the two positions assumed, and the undoubted facts which were brought to light during the inquiry as to the then past and present state of the river, as well as its then future prospects under the management of the Corporation.

The allegations of the promoters of the Bill were:—

1. That the conservancy of the river should be exercised, not exclusively by one of the communities on its banks, but should be shared by others equally interested. In olden times, when Newcastle was the only town of any importance, its claim to sole supremacy might have been admissible; but with the rise of North Shields, South Shields, and Gateshead, all flourishing towns equally with Newcastle, their claim to a share in the government of the river must be conceded.
2. That the Corporation had neglected, or improperly performed, their functions as conservators; and, instead of improving the river, had allowed it actually to deteriorate.
3. That the monies levied by the Corporation on the commerce of the river had been diverted from river purposes to lighting, paving, watching, and other municipal purposes of the town of Newcastle.
4. That the remedy for this state of things was

the transference of the conservancy to a representative board, to whom should be likewise transferred the whole of the dues levied on the river, as a fund wherewith to cleanse and improve the river.

To these allegations the opponents of the Bill replied:—

1. That a large Corporation like that of Newcastle was a more desirable body to be entrusted with the conservancy, and more likely to exercise such functions wisely and well, than a mixed commission.
2. That the Corporation had properly performed their duties hitherto, and had not allowed the river to become worse, but had spent great labour and money in works to improve it.
3. That the coal dues and other river dues were held by the Corporation *as a property*, in the same manner as properties were held by individuals, such dues being burthened only with the onus of maintaining the river. That after the performance of this duty of maintenance, the river dues—or town dues, as they were called—were as legitimately applicable to the town purposes of Newcastle as were the revenues of any individual landowner, after discharging his obligations to his property, applicable to his private use and benefit.

These were the leading positions taken up on a preliminary Admiralty inquiry into the merits of the Bill, held before Captain (afterwards Admiral) Washington in the early part of 1849.

Mr. Lietch on the part of the promoters, and Mr. Clayton on behalf of the Corporation, each with extraordinary ability endeavoured to make out the best case for their respective clients. On the close of the inquiry, Captain Washington presented his report thereon to the Admiralty, and the following extracts or summaries thereof are given from that report, as best showing what positions were by the inquirer held to be proved or otherwise.

After describing the objects of the Bill, the Captain raises the question—

1. What are the dues so levied on shipping and shipments, and how are they applied?
2. Has the conservancy of the river Tyne been so administered by the Corporation of Newcastle as to render it desirable for the public benefit that it should be transferred to other hands?
3. And if so, to whom, and what should be the constitution of the board?

He then goes on to describe the coal dues, ballast dues, town and quay dues, &c., and says that, during the preceding seven years, the income derived from the river (exclusive of payments for conveying

ballast) had exceeded £26,000 a year, whilst the sum laid out in improvements had been less than £5,000 a year.

According to an abstract of accounts which had been put in by the Treasurer to the Corporation, the whole amount received from the river since 1809, when the accounts were first printed, had been £957,973; whilst the whole sum laid out on the river, including all charges for conveying ballast, salaries, management, &c., during that period, had been £397,719—the difference between those two sums, exceeding half a million of money, having been appropriated to the lighting, paving, watering, and scavenging the streets of Newcastle. He points out that such an application of dues levied on shipments and shipping is contrary to the practice of nearly every harbour in the United Kingdom, and was specially objected to in the reports of the Tidal Harbours Commission as unjust and impolitic. As to what rights the ancient charters of the town may confer as to those dues he is unable to say, as the Town Clerk declined to produce them. He meets the plea of the coal due being a town due and not a river due, by saying that such due, being levied only on coal shipped in the Tyne, and not otherwise, seems to mark it out specially as a river due.

As to the past and present state of the channel of the river, and depth of water over the bar, Captain

Washington, after quoting the evidence, says, that the average depth of water on the bar was then (1849) the same as it was in 1813, about 6 feet—the complaint being, not that the bar was bad, but that whilst Sunderland and Yarmouth, both bar harbours on the same east coast of England, had within these few years gained from 4 to 6 feet in depth, the Tyne bar had remained stationary; and that, whilst the Clyde, the Tay, the Liffy, the Lagan, the Orwell, the Wyre, the Tees, and even the Nene, all similar river harbours, had within the last thirty years gained an increased depth varying from 4 to 10 feet up to the cities and towns respectively of Glasgow, Perth, Dublin, Belfast, Ipswich, Preston, Stockton, and Wisbeach, the Tyne up to Newcastle, with its enormous traffic and comparatively princely revenue, had remained stationary, if it had not deteriorated.

Captain Washington then surveys the evidence as to the improvement or deterioration of the river from the bar upwards, establishing that the depth and capacity of Shields harbour was being diminished, that the shoals from Shields to Newcastle, instead of being decreased, were increasing and extending. On Hebburn sand, four and a half miles from Newcastle, the “*Norval*,” drawing less than 12 feet, grounded on the top of high water during the time the inquiry was going on, and the “*London Merchant*” steamer, drawing only 11 feet, had three years be-

fore lain for two or three days on Pelaw Main shoal. But the adventures of the screw-steamer "Conside," on her voyage from Newcastle to sea, as related by Henry Oates, a pilot, one of the witnesses of the Corporation, were conclusive. This vessel was partly laden, and appeared then to have drawn about 9 feet water. She first grounded at the low part of Newcastle Quay, and lay there half an hour; she then stuck fast on Tyne Main shoal at one mile and a quarter below the bridge; got clear across Hebburn shoal by giving her full speed over the ground, but in doing so sunk a craft, and went against a lighter and sunk her also; then she went to sea. The witness added naively—"The 'Conside' is rather an unhandy vessel." Evidence was advanced by the Corporation that in some places the channel was better, and it was agreed that an improvement had taken place at Bill Point. There was also a difference of opinion as to the width of the channel of the river. The result of the Corporation's treatment of the river, however, was, that out of nineteen cross sections taken by Mr. Calver and placed by the side of similar cross sections from Giles' survey of 1813, there had been a gain upon eight and a loss on eleven sections in the thirty-six years. A comparison of the soundings in the sailing channel of the river showed even a worse result, proving that, whereas in 1813 a ship drawing $15\frac{1}{2}$ feet could sail up to

Newcastle Quay and have a foot to spare under her keel at high water of ordinary spring tides, a ship of similar draught, and under similar circumstances, could not, in the year 1849, cross Jarrow shoal at seven miles below Newcastle bridge. On these points Captain Washington says, summarily:—"It must be manifest that the several duties usually attached to the conservancy of a harbour have not been attended to on the Tyne; that the most ordinary duties of river engineering—such as regulating and deepening the channel, cutting off projecting points, dredging away or otherwise removing the shoals so as to produce a uniform bed of the river, registering the tides and freshets, and occasionally taking soundings and cross sections—have been all but entirely omitted; that sufficient quay accommodation for the traffic has not been provided; that no attempt has been made to improve the bar, or to stop out the sand brought daily into Shields harbour off the 'Herd,' or to get rid of the obstruction to the tide by the piers and starlings of Newcastle bridge; that the casting of ballast close to the entrance, and to a large extent in Shields harbour, had not been prevented; and that until within two years there were neither moorings for vessels nor river police to prevent theft, and that these had only been obtained by the imposition of an additional tax on shipping."

A heavy indictment truly is this to be brought

against the Corporation of Newcastle in their capacity of conservators of the river! Captain Washington says he does not blame the River Committee or the River Engineer; that no one knew better than several members of the River Committee what were the wants of the Tyne, but they were fettered by the great majority of the Council, who had general municipal duties to perform, and who had held the river dues and other revenues of the borough in one common purse.

It seems but right, however, to repeat, in reply to the great blame fastened on the Council for not trying to give effect to Rennie's well-conceived plan of improvement, that the scheme was received with great disfavour by the old nautical authorities, who, before the Municipal Reform Act, advised the Council on river matters. Mr. Clayton said that, although a young man at the time, he well remembered the effect produced on the minds of the old river jury by Mr. Rennie's proposal to abstract one-third of the whole bed of the river. The old jurymen were quite petrified, and Mr. Clayton thinks the lives of some of these worthies were shortened by their feelings of dread at the proposed innovations upon old ideas. With such feelings, it was not to be expected that the old Corporation should show any undue alertness to carry the scheme into effect. The reformed Corporation also laboured under great difficulties, as has

been stated ; but had these been overcome, as they should have been, and the river revenues devoted by the Council to well-considered and judicious plans of river improvement, a richer harvest of beneficial results would have been reaped than the little saving of town rates which the use of the river funds afforded.

The Lords of the Admiralty gave their cordial assent and approval to the Tyne Conservancy Bill, leaving the constitution of the new commission to be settled entirely by Parliament.

The Bill came on for hearing before a committee of the House of Commons on the 15th May, 1849. The committee consisted of—

- Mr. Philip Miles (Bristol), Chairman.
- The Earl of Arundel and Surrey (Arundel).
- The Hon. E. H. Stanley (Lynn Regis).
- Mr. G. Greenall (Warrington).
- Mr. W. H. Stanton (Stroud).
- Mr. William Ord (Newcastle-on-Tyne).
- Mr. T. E. Headlam (Newcastle-on-Tyne).
- Mr. R. W. Grey (Tynemouth).
- Mr. John Twizell Wawn (South Shields).

Sergeant Wrangham and Mr. Webster appeared for the promoters, Mr. Talbot and Mr. Hope for the Corporation of Newcastle, and Mr. Knowles on the part of the coalowners. The committee sat continuously for fifteen days hearing evidence and argu-

ments of counsel. On the 12th June the committee announced that they considered the *preamble of the Bill proved*, but were of opinion that the towns at the head of the navigation should have a larger share in the representation than the Bill allotted them. The clauses were afterwards gone into, and on the 13th June the committee apportioned the representation in the proposed new commission as follows:—

Newcastle	...	...	...	...	...	6
Gateshead	...	...	...	...	...	2
North Shields	...	...	...	...	...	2
South Shields	...	...	...	...	...	2
A number to be appointed by the Admiralty, not exceeding	...	...	...	...	...	5

£67,000 of the debt of the Corporation was allotted to the new commission.

Thus altered, the Conservancy Bill passed the House of Commons, taking away from the Corporation the whole of the coal dues and other dues levied on the commerce of the river. The counsel for the Corporation struggled hard for the principle of *compensation* to the Corporation to be admitted; but the committee decided against it, and held that the river dues were public funds held for public purposes, and could be dealt with in any manner Parliament thought right.

The Bill was ineffectually opposed on its second reading in the House of Lords, there being for the second reading—

Contents	...	...	...	...	...	42
Non-contents	...	...	...	...	...	30
						—
Majority	...	...	...	...	...	12

The Bill came for hearing before a Select Committee of the Lords on the 24th July, at which were present Lords Devon (Chairman), Wynford, Cowper, Canning, and Lyttelton, when evidence in favour was heard.

On the 25th July the Chairman asked the promoters whether there was a reasonable probability of getting through their case so as to have time for hearing the case of the opponents; that he must tell them it would require a strong case to induce Parliament to take from the Corporation the powers they possessed. Sergeant Wrangham, in reply, said that there was no prospect of their being able to finish their case in time for the impending prorogation of Parliament. The committee therefore came to the following resolution:—“That the promoters of the Bill having stated, that in consequence of the probable early close of the session, they decline at present to offer any further evidence; and having requested the committee to adjourn in order to give

time for some application to both Houses of Parliament, the committee have accordingly adjourned, and pray your Lordships' leave to adjourn, till Monday next."

The House of Lords rejected the application of the promoters to allow the Tyne Conservancy Bill to be treated as a suspended Bill, to be taken up in the then next session, at the stage which it had reached in the session of 1849. The Bill was therefore lost, not through any decision of the House of Lords against it, but simply for want of time, although significance must certainly be attached to the statement made by Lord Devon on the 25th July, that it would take a very strong case to justify their Lordships in passing it.

In the Parliamentary Session of 1850, the Tyne Conservancy Bill was again introduced. It proposed to vest the conservancy of the river in fifteen commissioners, to be appointed as follows:—

By Newcastle	...	...	...	...	3
„ Gateshead	...	...	...	...	1
„ North Shields	...	...	...	...	3
„ South Shields	...	...	...	...	3
„ Admiralty	...	...	...	...	5
					—
					15

The western towns of Newcastle and Gateshead, would thus have had only four representatives, as

against six Shields representatives. This differed materially from the first Bill, which allotted four commissioners to Newcastle, two to Gateshead, three to North Shields, three to South Shields, no Admiralty commissioners, but twelve in all. All the coal dues, ballast and other river dues, were proposed to be transferred to the new commissioners as by the Bill of 1849.

The Corporation of Newcastle likewise introduced a Bill, called the "Tyne Navigation Bill," which proposed to vest the conservancy in a body of commissioners to be called the "Tyne Improvement Commissioners," to be appointed as follows:—

By Newcastle Council	...	...	...	9
„ Gateshead	...	...	...	2
„ North Shields	...	...	...	2
„ South Shields	..	...	...	2
„ the Trinity House of Newcastle			...	2

 17

The Mayor of Newcastle was to be Chairman; the Town Clerk of Newcastle was to be Clerk to the Commissioners; all the books and records of the Commissioners were to be part of the records and muniments of the Corporation of Newcastle; and the Treasurer of the borough of Newcastle was to be the Treasurer of the Commissioners. The Corporation

were to continue to collect and receive all the river dues as heretofore; but the Treasurer of the Borough was to carry to the credit of an account to be called the "Tyne Improvement Fund Account," all the ballast dues, the import dues (town and quay dues), groundage and plankage, ship and boat dues, and ballast office dues, which, together with *one-fourth* of the coal dues, was to constitute the fund for carrying the Act into execution. The remaining *three-fourths* of the coal dues to be retained by Newcastle for *town purposes* only. In substance, a commission so constituted would have been practically a committee of the Corporation.

The Bill also took powers for the execution of certain works of improvement in the river, both below and above Newcastle, and for the construction of a pier on the Herd Sand.

On the then member for Tynemouth, Mr. Ralph William Grey, proposing that the Tyne Conservancy Bill be read a second time in the House of Commons, Mr. William Ord, the member for Newcastle, proposed as an amendment, "That it be read a second time that day six months," when it appeared there were—

For the second reading	...	...	...	131	votes.
Against	...	...	...	63	„
				<hr/>	
Majority	...	...	...	68	„

The second reading of the "Tyne Navigation Bill" was opposed by Mr. R. W. Grey. Mr. Grey's amendment was, however, withdrawn, and the Bill read a second time without a division.

In March, 1850, a local Admiralty preliminary inquiry into the merits of the "Tyne Navigation Bill" was held by Edward Lawes, Esq., barrister-at-law, and James Abernethy, Esq., civil engineer, who sat for eighteen days, going fully into all the points which Captain Washington had investigated in the previous year.

The Admiralty report on the Bill recommended strongly that the management of the River Tyne should be vested in a commission, that the new commissioners should be the parties to judge of the requisite measures of river improvement, and that consequently the works proposed by the Bill should not be sanctioned. Their Lordships also recommended that the greatest possible amount of dues then levied on shipping in the Tyne should, consistent with legal rights, be applied to the new conservancy.

The two Bills, "Tyne Conservancy" and "Tyne Navigation," came on for hearing before a Select Committee of the House of Commons, consisting of—Sir John Yarde Buller (Chairman), Sir John Duckworth, Hon. W. F. Campbell, Mr. Mullings, Mr. Duncan, Mr. Ord, Mr. Headlam, Mr. Grey, and

Mr. Wawn. Sergeant Wrangham and Mr. Webster appeared for the Shields Bill; Mr. Talbot, Q.C., Mr. Hope, Q.C., and Mr. Temple, for the Newcastle Bill; and Mr. Lucas for the Duke of Northumberland.

The committee decided to consider the Bills as separate Bills, taking the Conservancy Bill first, but not coming to a decision on one Bill until both had been heard.

After the evidence adduced by the promoters of the Conservancy Bill had been heard, and the case for the Navigation Bill been commenced, the committee resolved not to enter upon the plans of improvement sought to be sanctioned by the latter Bill, but to leave the new board unfettered in its judgment as to improvements. On the 10th May, 1850, the committee decided that the preamble of the Tyne Navigation Bill was proved. The committee came to no decision on the Shields Bill, but retained it as a guarantee for the promotion of the Newcastle Bill in good faith by its promoters. The committee then adjourned, with the view of allowing the promoters of the two rival Bills to meet and endeavour to agree. Such a meeting was held, when the following arrangement was come to by the respective parties:—

1. The number of commissioners for each town to be fixed by the House of Commons.
2. Two life commissioners to be appointed by the promoters of the Newcastle Bill and two by

the opponents of that Bill. Vacancies in these four commissioners to be filled by the Admiralty.

3. The Tyne improvement fund to receive three-eighths of the coal dues instead of two-eighths, as proposed by the Bill.
4. The taxed costs of the promoters of the Shields Bill to be paid out of the river funds.

The committee met again on the 13th May, and decided that the number of commissioners should be as follows, viz:—

Newcastle	...	...	...	...	6
Gateshead	...	...	...	...	2
Tynemouth	...	...	...	...	3
South Shields	...	...	...	...	3

In addition to which the promoters of the Newcastle Bill to appoint two, and the promoters of the Shields Bill two commissioners for life—the first vacancy in each pair of these last appointments to be filled up by the Admiralty, the second vacancies not to be supplied at all; so that ultimately there would be fourteen elected commissioners and two Admiralty commissioners. For a time there would be eighteen commissioners in all. The Commissioners to have the appointment of their own chairman and officers; the then present Town Clerk and Treasurer of the Borough, however, being made respectively Clerk

and Treasurer to the Commissioners during their lives, or till their resignation of office. The dues to be collected by the Corporation in the first instance, and paid over by the Treasurer of the Borough to the Commissioners. The Tyne improvement fund to be charged with £67,000 of the Corporation debt, being the cost of the extension of Newcastle Quay, and with £12,000 payable to Sir W. A. Maxwell for the Howdon Dock property. The expenses of both Bills to be defrayed out of the river funds.

Mr. (now Sir) William George Armstrong and Mr. Joseph Cowen were agreed upon as the two life commissioners to be appointed by Newcastle, and Messrs. William Purdo, R.N., and James Cochran Stevenson as the two to be appointed by the promoters of the Shields Bill. The amendments mentioned, together with the names of the above-named gentlemen as life commissioners, were made in the Bill; and, thus altered it was passed by the House of Commons on the 13th June. Several members of the Newcastle Council expressed dissent from the terms of compromise, Mr. Clayton making the very significant remark, that the great advantage to the Corporation by the Bill was, that the Corporation got rid of an *uncertain charge which might have absorbed all their funds*, and acquired a certainty instead. The name of Mr. William Rutherford Hunter was substituted as a life commissioner for that of Mr. W. G. Armstrong.

The Bill passed through its various stages in the House of Lords, an indemnity clause being inserted to the effect that in case damages should be recovered by any person for injury caused by works done by the Corporation as conservators, or with the object of improving the navigation of the River Tyne, or by any act done by the Corporation as conservators, it should be lawful for the Corporation to recover the same from the Commissioners.

This clause was objected to by the Shields people.

The Bill finally became law as the River Tyne Improvement Act on the 15th July, 1850.

The result of this struggle was to take the management of the river from under the sole control of Newcastle, and vest it in a commission pretty fairly representative of Tyneside. This had become a necessity. The duties of the conservancy of a river on which so many great towns had grown up, were not such as should be entrusted solely to one town alone. Gateshead, Tynemouth, and South Shields were large enough to speak for themselves. By the admission of the harbour towns into the representation, a large amount of nautical, shipping, and maritime knowledge and experience was at once admitted, and a long-felt sense of exclusion and injustice put an end to. The new commission would in some respects have everything to learn, but, fortunately, nothing to unlearn. Not so would it have

been with the Corporation. Corporations, no more than individuals, can easily change their natures or habits of thought and action, but, unlike individuals, Corporations have long memories. The corporate memory naturally extends back through the long-past ages when the Town Council had been undisputed lord and master of the Tyne, with all its grand resources and accompanying prestige; when it could disregard or discharge conservancy duties as it listed, uninfluenced by the modern power of public opinion; when it could afford to neglect newfangled notions of artificial improvements, and wrap itself in the wisdom of bye-gone days. Although these ideas had, of course, been much lowered by changes of time and the requirements of modern commerce, and though the reformed Corporation exhibited on many occasions a real desire to adapt themselves accordingly, yet it evidently required a new body, starting with new ideas, and aiming solely at the interests of the river, to proceed vigorously with the work of improvement.

It was fitting and proper, however, that the town of Newcastle, from its position, wealth, and population, as well as its historic past, should continue to have a potent voice in river matters, and this was voluntarily conceded to it by Parliament.

The largest class of vessels using the Tyne at this time did not generally exceed 400 tons register,

being principally sailing ships. The modern screw colliers had not then made their appearance; but there were the London, Edinburgh, and other coasting lines of steamers, and the lines of Mr. John Ormston, and others, to Hamburgh, Rotterdam, and a few more adjacent Continental ports.

The Tyne had been great in shipbuilding. Several very fine wooden vessels, large for the time, had been built and launched from Newcastle, such as the "Blenheim," the "Marlborough," and others, by the Messrs. Smith, at St. Peter's; but the days of the great iron steamers and huge war vessels which were to glide majestically from the yards of Palmer, Leslie, Mitchell, and others, were as yet in the future.

THE TYNE UNDER THE TYNE IMPROVEMENT
COMMISSIONERS FROM 1850 TO 1860.

From the foregoing it will be seen that at the time the River Tyne came into the hands of its present conservators it was an unimproved river. The condition of the Tyne was certainly not better in 1849 and 1850 than it had been in 1813, at the time of Rennie's survey—the balance of testimony, indeed, being that it was actually worse.

The funds transferred from the Corporation to the new Commissioners were of very slender amount, and burdened with a debt of £67,349, together with upwards of £20,000 for the costs of the great Parliamentary contests of 1849 and 1850. The Commissioners had also to purchase the dredger and river plant, so they may be said to have had at the outset the incubus of debt of about £100,000. The gross revenue transferred amounted to about £20,000 per annum. The fixed charges upon this, however, were so great, for expenses of conveying ballast, interest on debt, port and harbour charges, salaries, collecting dues, and such like, that not more than half could be called nett revenue—say £10,000. The working of the one imperfect dredger absorbed

between £4,000 and £5,000, thus leaving only about £5,000 a year actually applicable to new works of improvement

The five-eighths of the coal dues retained by the Corporation under the Act, entirely discharged from all river liability, amounted to nearly £10,000 per annum; so that, on the separation of the town and river, each got about one-half of the whole dues earned on the river.

The Commissioners, at their first meeting, held in the Guildhall, Newcastle, on 14th November, 1850, resolved that Mr. J. M. Rendel, C.E., the eminent engineer, who had surveyed the river and reported thereon during the conservancy contest, and Mr. W. A. Brooks, C.E., the local engineer, should be asked to report to the Commissioners their views as to the steps to be taken to improve the river.

On the 13th February, 1851, a most important document was laid before the Commissioners by the agents of the Duke of Northumberland and the lessees of the extensive collieries shipping coals at the staiths on the north side of the river at Hayhole. The capital employed by the memorialists was stated to be £900,000, and their annual shipments of coal one million tons. The memorialists complained (as they had previously complained to the Corporation) of the great and increasing injury that had resulted to their great coal shipping places from the execution

of works by the Corporation in the bed of the river westward of those shipping places, more especially at Willington Quay, where a groin had been constructed which projected about 330 feet from the former high water line of shore. The result of these works at Willington had been to divert the current of the river from its former course, thus shoaling the berths and entailing ultimate destruction of the commercial facilities which had been hitherto enjoyed at this place, the maintenance of which, the memorialists contended, was essential to the welfare of the port in connection with the staple commodity of the district. One of the suggestions submitted was the lengthening of the staiths by carrying them forward out of the bight into the channel of the river, which would be attended with an estimated cost of £64,000; but this, it was stated, would only partially remove the evils complained of. On the 20th April, 1851, the memorialists again urged their grievances, affirming that since the date of their former complaint a considerable change for the worse had taken place. These representations were transmitted by the Commissioners to Mr. Rendel for consideration by him in framing his report.

It should be stated that, in view of this complaint, a clause (63) had been inserted in the Act of 1850 which, in saving the rights of the Duke of Northumberland, provided that nothing in the Act was to

debar the Duke from his right to commence proceedings against the Corporation in respect of any damage which had or might accrue by reason of the construction of the works at Willington. This, in connection with the following clause (64), already explained, which made the Commissioners liable for any damages recovered against the Corporation, made the funds of the Commission liable for the consequences of this very serious state of things; and it was evident that, unless some other plan could be devised for saving the river funds, the whole of their then slender resources might have been swallowed up in dealing with this one section of the river alone.

In the latter part of 1851 the reports of Mr. Rendel and Mr. Brooks were received by the Commissioners. Mr. Rendel recommended a comprehensive design of river improvement, including two sea piers, one on the Herd Sand and another on the north side of the river; two inner or training piers or walls on each side of the river at the Narrows; a half tide embankment across the Dortwick Sand; the removal of Hayhole and Whitehill Points; a half tide dock at Hayhole, and a stone embankment at Jarrow Slake; a half tide bank from Howdon to Bill Point; a new quay at Walker, and excavations at Bill Point; a half tide wall from Jarrow Quay to Pelaw Main staith; the removal of Friars Goose and various other points, and the improvement of the river line

on the south side of the river upwards; the removal of the old and the construction of a new bridge at Newcastle; the cutting of a new channel for the river from Scotswood to High Stella, and the conversion of the old channel into two docks; a cutting at Newburn Point and the formation of some training walls. Mr. Rendel expected by these means to attain a minimum depth of 10 to 11 feet at low water on the bar, and from 6 to 7 feet in a fairway channel up to Newcastle, of a good average width. He placed great stress on the improvement of the river above bridge, both for commercial purposes and as a receptacle for tidal water. He also stated that the first works of improvement should be directed to the bar and entrance of the river.

Mr. Brooks, in his report, recommended for entrance works both a north pier and south pier, but of different designs to those of Mr. Rendel; the formation of river walls at Jarrow Quay and Jarrow Slake, and the construction of certain transverse jetties and longitudinal river walls in various parts up to Newcastle; also the carrying out of some works of a limited nature for the improvement of the river above Newcastle. Mr. Brooks stated that the primary element of improvement on which he relied was the training, concentration, and proper direction of the natural stream of the ebb of the river.

It is noticeable, in the light of the works hereafter

to be described, how little weight Mr. Rendel and Mr. Brooks attached to steam dredging as a means of river deepening. They both, to a certain extent, indeed, recommended partial dredging; but the main feature of their schemes, however differing in other respects, aimed at making the river, by means of training walls and regulation of the channel, to become its own dredger, and greatly to improve and maintain itself. The modes proposed, however, by the two engineers differed widely both as respects the entrance works and the works for training and improving the channel of the stream—Mr. Rendel's training works consisting chiefly of half tide walls; Mr. Brooks's works principally of jetties, transversely to the stream, ultimately connected together by full tide embankments. Mr. Brooks strongly objected to Mr. Rendel's proposals, stating that it was impossible for them to realize the objects stated in Mr. Rendel's report. Conferences between those two gentlemen failed to harmonize their views.

After the receipt of these reports, the agents of the Duke of Northumberland and the lessees of collieries shipping at Hayhole waited on the Commissioners, again urging attention to their requirements.

The Commissioners finally resolved to apply to Parliament for the necessary powers of improvement, which would embrace the adoption of such parts of Mr. Rendel's and Mr. Brooks's schemes as might be

determined on, so far as concerned the construction of sea piers and the construction of a dock at Hayhole. There were afterwards added additional powers for obtaining control of the river moorings, and the provision of additional moorings.

Arrangements were entered into with the Duke of Northumberland and his lessees, by which the dock at Hayhole was to be made a full tide deep water dock, instead of a half tide dock, as proposed by Mr. Rendel; the expense of the construction of such dock to be defrayed by borrowed capital to be raised on security of the dues on shipping and merchandise to be levied in the dock. By this arrangement it will be seen that the dock, being converted into a remunerative commercial undertaking, freed the river funds from a very great and oppressive burthen. The execution of the dock works saved the necessity for other works which would have had to be constructed at the expense of the river. If the river fund had had to bear the cost of carrying the shipping places out to the new river line, and in addition the constructing, probably, of river training walls along the long inlet of Hayhole, the burthen would have been greater than it could bear, and the addition of some river dues would have been then requisite for that purpose alone.

The Commissioners in their Bill took powers also to levy a tonnage due on shipping for the construction

of piers at the entrance of the river, to be called "The Piers Due."

The Tyne Improvement Bill, thus framed, went through the ordeal of a preliminary local Admiralty inquiry before James Walker, Esq., C.E., who reported strongly in its favour. The Lords of the Admiralty likewise supported it, and, after trifling opposition, it became law as the Tyne Improvement Act, 1852.

In proceeding to put that Act into operation by obtaining working drawings and specifications for the works of the dock and piers, it soon became evident that the then engineer of the Commissioners, Mr. Brooks, did not fully possess the confidence of the entire body of Commissioners. These plans, so far as the dock works were concerned, were entrusted to Mr. John Plews, C.E., of London, who was named by Mr. Clayton as having had great experience in dock works at Cardiff and other places.

With regard to the very important matter of the piers at the mouth of the river, differences being found to prevail between the engineer of the Commissioners and the professional advisers of the Admiralty, it was ultimately agreed by the Lords of the Admiralty and the Commissioners to refer the whole matter to the decision of the eminent engineer, Mr. Walker, who, as already stated, had held the preliminary Admiralty inquiry. Mr. Walker was to

be left entirely unfettered within the limits of deviation of the Act of 1852, to select or modify any proposed plan, or to originate any other plan, as he might deem proper to cover his responsibility in so grave a question. The Admiralty requested him to receive the evidence of Captain Washington, R.N., Mr. Calver, R.N., and Captain Veitch, R.E., on the matters submitted to him, and such evidence as the Commissioners should propose, as well as what Mr. Walker himself might desire.

Mr. Walker accepted the appointment, receiving evidence very fully in London, Tynemouth, and Newcastle, and finally made his report on the 15th November, 1853. He states that the designs submitted to him were those of the late Mr. Rennie, Mr. Brooks, Captain Washington, R.N., Captain Veitch, R.E., Captain Purdo, Mr. Calver, R.N., Mr. Thomas John Taylor, and Mr. Henry Turner. Mr. Walker says that the great evil, to the removal of which all the designs (including his own) had been directed, was the bar. In the position and direction of the piers, which he submitted with his report, he had also been influenced by various considerations besides the removal of the bar. The following were the principal :—

1. To give heavy seas space to spread and spend themselves immediately after passing the piers, so that vessels having got inside the

piers may be in quieter water in a kind of outer harbour.

2. Not to lessen materially the extent or area of sloping sand, which is useful not only for the above purpose, but also for vessels beaching upon it in case of their being obliged to do so.
3. To enable vessels entering with scant northerly or southerly winds to haul close up under either the north or south pier, and so to escape getting on a lee shore, and, owing to the proposed height of the piers, to be sheltered from the violence of the winds.
4. To give to laden outward-bound ships shelter from the worst winds until they clear the pier heads and get into deeper water; and
5. To enable tug-boats to get further out to assist ships in entering or leaving the harbour.

The designs were—

A north pier to start from the rocks under Tyne-mouth Castle in a direction nearly south-east to a length of 700 yards; a south pier to start from the shore opposite the workhouse, South Shields, and to take an east-north-east direction to a length of 1,400 yards; each terminating in a depth of about 15 feet at low water, leaving a distance between the two pier heads of 1,100 feet.

The foundation stones of these piers were laid on the 15th June, 1854, by Joseph Cowen, Esq., Chairman of the Commission. A considerable time, however, elapsed before much work was done. Mr. Walker was ultimately employed by the Commissioners to prepare the detailed working plans and specifications, and to have charge of the execution of the works. A tender for the construction of a portion of both piers from Mr. Benjamin Lawton was accepted on 13th September, 1855, and Mr. P. J. Messent was appointed resident engineer.

The plans of the Northumberland Dock, prepared by Mr. Plews, comprised a dock of 55 acres, with a tidal basin having an area of 2 acres; a main entrance through this basin 70 feet wide, and a lock alongside of 52 feet wide; with a depth of 10 feet water at low water on the cills.

A tender for the execution of the principal part of the works of this dock was accepted from Mr. David Thornbury, of Washingborough, Lincoln, on the 9th June, 1853. Mr. Thornbury proceeded immediately with his work, and on the 12th September, 1854, the foundation stone of the masonry of the dock was laid by Mr. Cowen. The massive wrought-iron gates for this dock were afterwards contracted for and manufactured by Messrs. Hawks, Crawshay, and Sons, of the Gateshead Ironworks.

Although the Commissioners had acted in these

important works of the dock and piers with tolerable unanimity, the very great divergence of opinions amongst them on the subject of the general improvement of the river soon began to display itself. It was to be expected that when the discordant elements of eastern and western views of river policy, which had been the cause of years of bickering and legal and Parliamentary contest, first met together in council, division and disagreement would be the result. It required, as it were, a time to have the old battles fought out, before the jarring sections of the new body could settle down, as they did afterwards, so thoroughly to their work of practicable improvement.

The Newcastle and western representatives generally supported the system which had been pursued by Mr. Brooks, of jetties, full tide walls, and the narrowing of the river by the formation of large tracts of land abstracted from the water space. The Shields Commissioners, on the other hand, generally favoured Mr. Rendel's views of half-tide walls, which were designed to train the current without the attendant loss of tidal capacity which the solid embankment of land caused. They also contended that the late conservators, in their embankments of land from the river, had been more guided by a desire to obtain valuable additions of land to the Corporation's property—which in many cases adjoined those embank-

ments—rather than by a pure desire for the improvement of the river, and the plan being pursued was simply a continuation of that bad system.

The proceedings of the Commission in its earlier years abound in discussions and divisions on this subject of full tide or half tide walls, and the alleged injurious diminution of tidal area. The large proportion of the river dues being received by the Corporation, and the small amount received by the river fund, was also the cause of constant discontent and recrimination. The funds applicable to the river were utterly inadequate for the execution of any comprehensive scheme of river improvement, even if the Commission had been sufficiently unanimous to agree on any such scheme, while the lands obtained by the Corporation from the foreshores and their five-eighth share of the coal dues were of very great and yearly increasing value. The continuance of this system of cross jetties, and the formation of solid embankments by filling up portions of the river with the dredged material and with ballast brought by vessels from other ports, as well as the alienation of the foreshores of the river to private parties without compensation, was resisted strongly by the minority of the Commissioners.

In 1854 the Jarrow Dock Bill was before Parliament, which proposed to abstract about 50 acres of Jarrow Slake, on the line laid down by the late Mr.

Rennie, for dock purposes. The Commissioners gave a general support to this Bill in consideration of the increased commercial facilities it would confer on the port, they being, at the same time, professionally advised that the construction of the Dock, on the plans proposed, would have a beneficial effect on the general navigation of the river.

The Bill, in its progress through Parliament, was opposed by the Admiralty, in order to compel the promoters to accept a clause to the effect that on any injury to the bar being proved to be the result of the abstraction of the tidal space proposed, the railway company should be compelled to do an amount of dredging corresponding to such injury.

The occasion of the Bill brought the objections of the minority against the proceedings of the majority before the Lords of the Admiralty; for, on the 3rd June, 1854, six of the River Tyne Commissioners, viz., William Purdo, James C. Stevenson, William Linskill, Matthew Poppelwell, John W. Lamb, and Joseph Straker, addressed to Sir James Graham, the First Lord of the Admiralty, an urgent remonstrance against the system of works being prosecuted on the Tyne, setting forth the continual diminution of the sectional area of the river, and the serious consequences to be apprehended therefrom.

In corroboration of their statements, Captain Calver's evidence was given: that the volume of

water in the channel of the river between Newcastle bridge and the sea had diminished between 1813 and 1849 by no less a quantity than 34,261,000 cubic feet at each tide, and that the pernicious system which had produced this result was being persisted in by the majority; that up to the change in the conservancy the tidal area of the Tyne had been diminished to the extent of 95 acres by encroachments unnecessary and injurious to the river, and by the continuance of these encroachments a great and irreparable injury was being done: that the ground abstracted was let on long leases at high rents, as valuable sites for manufacturers, by the Corporation of Newcastle, in front of whose estates these encroachments had been principally made. These remonstrants pressed upon the Admiralty as a practical step the necessity of their ordering a fresh survey of the Tyne, or such portions of it as were alleged to have become worse, to be made forthwith, in order that the further results of the past five years might be clearly exhibited.

On the 20th July the majority replied to this remonstrance through the chairman (Mr. Cowen), denying indignantly the allegation of an unsound and ruinous system of engineering being pursued, or that the interests of the river were sacrificed for the sake of increasing the estates of the neighbouring landowners; that the majority of the Commissioners

repudiated the quackery of amateur engineers, and acted on the opinion of the first engineers of the day, amongst whom were named Sir William Cubitt, Mr. Rendel, and Mr. Robert Stephenson; and that in no case had the Commissioners sanctioned the enclosure of any portion of the foreshore of the river Tyne unless in cases where such enclosure was obviously for the benefit of the navigation.

THE ROYAL COMMISSION, 1855.

These proceedings resulted in the appointment of a Royal Commission on the motion of Mr. W. S. Lindsay, M.P. for Tynemouth, in the House of Commons, for the purpose of "enquiring into the present state of the River Tyne, and whether the encroachments on the tidal waters of that river by jetties, embankments, and other works executed and proposed on the banks thereof, have not injured the navigation, and would not continue to counteract the plans for removing the sandbanks at the mouth of the river, and otherwise injure the navigation of that important river."

The Commissioners appointed by the Crown were Rear-Admiral William Bowles, R.N., Lieutenant-General Sir John Bell, Robert Fitzroy, Captain R.N., Robert Baynes Armstrong, Q.C., and Isambard Kingdom Brunel, C.E.

These Commissioners held sittings at Newcastle from the 24th to the 31st January, 1855, and afterwards in London. The views of the minority were represented by Mr. Webster, Q.C., and those of the majority by Mr. Digby Seymour, Q.C. Very voluminous evidence, engineering and nautical, was adduced on both sides; Mr. Brooks, C.E., Mr. Thomas John Taylor, Mr. J. F. Ure, C.E., Mr. Rendel, C.E., Mr. R. Stephenson, C.E., M.P., Mr. James Walker, C.E., Mr. John Murray, C.E., Captain Calver, R.N., Captain Purdo, R.N., Captain Linskill, Mr. Stevenson, and others, being all examined.

The Royal Commissioners, in their report dated 19th May, 1855, state that during the last two or three centuries all the evidence would lead to the conclusion that a very general similarity had been maintained in the state of the Tyne, notwithstanding local and partial changes. In the present century much more exact surveys had shown a similar result, namely, that notwithstanding encroachments on both banks, and many artificial works executed with various objects, the navigable state of the river had not been much altered. The general correspondence between Mr. Rennie's survey of 1813, that of Mr. Rendel in 1849, and that made by Mr. Comrie for the Commissioners in 1854, though certain differences occur, is striking, and tends at once to prove not only the correctness of the surveyors, but the surprisingly small amount

of change that had actually taken place in the general depth and navigable capacity of the Tyne.

Adverting to the elaborate inquiries instituted by the Admiralty, the Commissioners state from these and other sources they have been enabled to prepare an analysis, which gives positive and unquestioned results, uninfluenced by opinion or prejudice, as to the state of the river in those three successive periods of 1813, 1849, and 1854, confirming the opinion that very little change had, upon the whole, taken place during the period of upwards of forty years in the actual navigable capabilities of the river.

The opinion of the Commissioners was in favour of the construction of full tide walls carried continuously along well-defined river lines, somewhat similar to those laid down by Mr. Rennie in 1813, and which had been approximately adhered to by the engineer of the Tyne Commissioners. The report is summed up by saying:—"Subject to these qualifications with reference to the past, and to these conditions as affecting the future proceedings, we are of opinion that the encroachments on the tidal waters of the Tyne by jetties, embankments, and other works executed and proposed on the banks thereof, *have not injured the navigation*, and will not counteract the plans for removing the sandbanks at the mouth of the river, or otherwise injure the navigation of that important river."

The report concludes by the expression of a hope “that the differences which had heretofore prevailed in the Tyne Commission, and so much interfered with its usefulness, might thenceforth cease to exist; that all its members might be induced to believe that the interests of Newcastle and Shields were identical and inseparable; and to bury in oblivion those local jealousies and animosities, which could only prejudice the community to which they belong.”

The report was signed by the whole of the members of the Royal Commission.

We thus see that, up to 1855, the river remained substantially unimproved; and that in 1854, as in 1849 and as in 1813, it was very nearly what it had been in its natural state for centuries previously.

From the date of this Royal Commission, however, a more uniform action, and a determination to effect some real and practical improvement of the river, began unmistakably to display itself amongst the Tyne Commissioners. It was unfortunate that Mr. Brooks, the engineer, did not more thoroughly possess the confidence of the entire body, for this was a very considerable bar to their united and vigorous action.

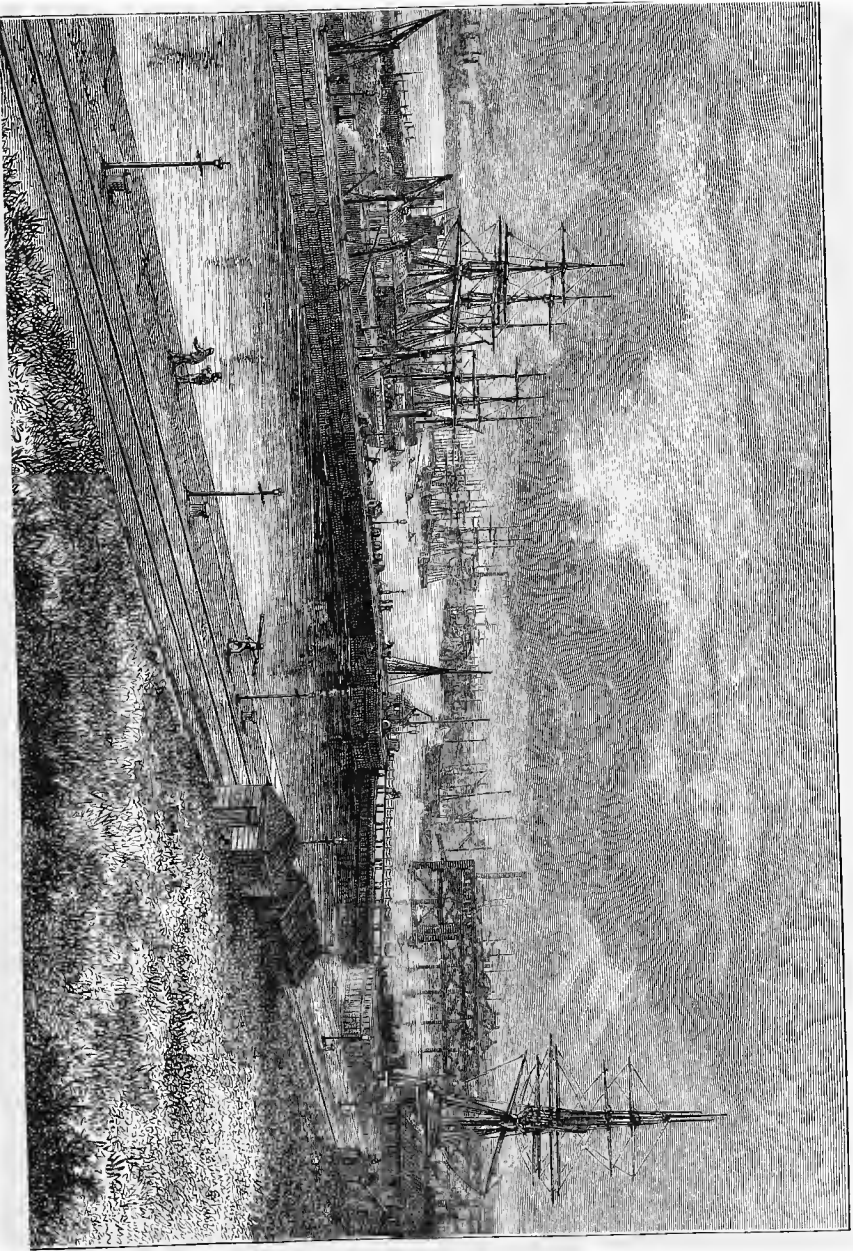
During the next few years the dredging operations were carried on with more vigour, the works of the dock and piers were proceeded with, and a very valuable system of efficient mooring accommodation was provided in Shields Harbour.

In 1857 the Commissioners applied for and obtained an Act incorporating the Commission, and conferring further powers on them, with authority, also, for the construction of a deep-water dock in the Coble Dene. This dock, however, was not proceeded with.

OPENING OF THE FIRST PUBLIC DOCK IN THE TYNE.

In June, 1857, the Northumberland Dock, which had been in course of construction for four years, was so far completed as to be then opened for traffic. The last stone of the masonry was laid by His Grace the Duke of Northumberland on the 22nd October, 1857, on which occasion a banquet was given in order to celebrate the opening of the first great public dock in the Tyne. His Grace the Duke of Northumberland occupied the chair, and there were present representatives of all the great industrial interests of the North of England. Mr. Cowen, the chairman of the Commission, gave many pertinent and suggestive figures bearing on the trade of the port, and showing what substantial results certainly awaited the adoption of any vigorous measures of practical improvement.

This was the first occasion on which any substantial improvement, or great plan for the benefit of the Tyne, had been undertaken and successfully com-



Northumberland Dock.—River Tyne.

pleted by its conservators, and was a legitimate subject for congratulation. It seemed as if the stagnant waters of inertia were at last being moved by the modern spirit of improvement, and that the Tyne was now entering in earnest on that path of progress and development on which hitherto such feeble and faltering steps had been taken. Not before time. The South Docks at Sunderland had been for some years in operation, and the people of the Wear, determined to overcome the obstacles presented by their shallow bar and river entrance, had, in their enterprise, constructed an entirely new and deeper sea-outlet from their dock. The system of the West Hartlepool Docks was rising rapidly into deserved importance under that vigorous management and public spirit which, in a few years, had converted a barren shore into a great port and town, with its railway communications radiating to every part of the kingdom.

OPENING OF THE TYNE (OR JARROW) DOCK.

This large and spacious dock on the south side of the river, constructed by the North-Eastern Railway Company, was formally opened for traffic on the 1st of March, 1859. The designs were from the engineer, Mr. T. E. Harrison, C.E., and executed under the personal inspection of Mr. Robert Hodgson, C.E.

The dock comprised a water-space of 50 acres, having also an outer basin and two entrances. The main entrance gates were 80 feet in width, and a Lock entrance 60 feet in width. The provision for the rapid shipment of coal was of the most complete and extensive character, upwards of 30 vessels being able to be loaded at one time. Provision was also provided for a general import and export merchandise traffic. The standage ground and approaches were equal to 25 miles of railway. Mr. H. B. Thompson, chairman of the company, presided on the occasion; with Mr. George Leeman, vice-chairman. The Right Hon. Lord Ravensworth and the Right Hon. the Earl of Carlisle, together with most of the directors and a large number of the representative industrial chieftains of the north, were present and took part in the proceedings. Several prior schemes for the construction of docks on Jarrow Slake had from various causes fallen through. The splendid docks now inaugurated were of a vastly superior character to those earlier designs, and eminently calculated to add to the commercial importance of the Tyne.

THE TYNE AS A HARBOUR OF REFUGE.

From a very early period after their formation, the Commissioners had strongly pressed upon Government the claims of the Tyne for favourable con-

sideration in any scheme for the expenditure of national grants on the formation of harbours of refuge. In the year 1854 an influential deputation from Tyneside waited with this view on the Board of Trade and the Admiralty.

In the year 1857 this question of national harbours of refuge was attracting a vast amount of public attention, and in that and the succeeding year a committee of the House of Commons sat to receive evidence on the subject. A large amount of facts and evidence was collected, and a Royal Commission was appointed to inquire into the whole matter.

This Royal Commission held local inquiries throughout the kingdom, sitting, amongst other places, at Tynemouth, Sunderland, Hartlepool, and Redcar. The Tyne Commissioners gave evidence both before the Parliamentary Committee and the Royal Commissioners, and in every way pressed the claims of the Tyne.

The authorities of the Tyne, the Wear, and the Tees, united in maintaining the position that the most judicious expenditure of national monies for this object would be in the improvement of the entrances of existing harbours, where vessels must come, rather than on the construction of one or two great artificial harbours, which were experimental, and might not, after the construction, really answer the purposes for which they were designed. The contrary position

was advocated by other parties; and, so far as the north-eastern coast was concerned, the claims of Hartlepool, Redcar, and Filey were strongly pressed as proper sites for great national refuge harbours.

In the evidence put forth by the Tyne Commissioners, it was stated that the Tyne piers could be advantageously extended into 36 feet at low water, instead of terminating, as they were then proposed to do on the design being executed, in 15 feet at low water, and thus practically convert the Tyne into a harbour of refuge. The designs for this extension of the piers were obtained by the Commissioners from Mr. Walker, C.E., and notices were given of an application to Parliament to carry the same into effect.

The Royal Commissioners on Harbours of Refuge, in their report to the Crown dated 3rd March, 1859, recommended, amongst other grants, a distinct grant of national money in aid of the proposed Tyne works. They say:—"It now remains only to deal with the amount of the grant in question; and, considering the very large proportion which the shipping trading to the ports will bear to those of the passing trade which will resort to it, either for life or refuge purposes, we are of opinion that the amounts of national and local benefits conferred will be fairly represented by the proportion of one-fourth to three-fourths respectively. We therefore submit that the sum of

£250,000 be granted in aid of the improvement of the Tyne, to meet a sum of £750,000 raised in the locality, and to be applied to the same purpose—of these sums £200,000 and £600,000 respectively to be applied to the completion of the works at the entrance of the Tyne, shown in detail on the plan, and the remainder in the improvement of the river from its entrance upwards, commencing by dredging a channel of not less than 18 feet through the bar into Shields Harbour.”

Thus, on condition of the Tyne Commissioners expending £750,000 on entrance works and internal dredging, it was deemed by the Royal Commission just and right that the nation should supplement such expenditure by a free grant of £250,000 to enable £1,000,000 to be spent.

In respect of Hartlepool it was recommended that, on condition of the locality providing £500,000, the nation should provide a second £500,000 to enable £1,000,000 to be spent in the construction of a harbour of refuge in Hartlepool Bay. A sum of £800,000 was recommended to be granted for the construction of a harbour of refuge for passing vessels at Filey.

The Tyne Improvement Bill in its preamble recited the before-named recommendation of a free grant of £250,000 to the Tyne, and took powers for carrying the piers into 36 feet at low water. The Bill also took other powers for the deepening and extension

of the Northumberland Dock, and in this shape became law as the Tyne Improvement Act, 1859.

Before pursuing the narrative as to other matters, it will be well here to complete it so far as regards the proposed grant to the Tyne. In February, 1860, the Tyne Commissioners, in conjunction with Hartlepool and Filey, organised a very influential deputation, who waited on Lord Palmerston to urge the carrying into effect by Government of the recommendations of the Commissioners on Harbours of Refuge. In June, 1860, Mr. W. S. Lindsay, M.P., carried a resolution in the House of Commons in favour of those recommendations.

The Tyne Commissioners have never failed, but have been most persevering from that time to the present, by petitions to Parliament, memorials to Government, and in every legitimate way, to urge the paramount claims of the Tyne for national assistance in aid of their works. The Tyne is the only harbour in the kingdom which has complied with the conditions on which such aid was to be given—in fact, much more than doubly complied therewith—and the port has actually served and is serving the purposes of a national harbour of refuge to a degree beyond the most sanguine hopes originally entertained. But all these efforts have been unavailing; no national grant has been given, nor is there any well-grounded hope of getting any.

Following up other recommendations of the Harbours of Refuge Commissioners, the Government in 1861 passed an Act called "The Harbours and Passing Tolls Act, 1861," which authorised loans from the Public Works Loan Commissioners at a low rate of interest to harbour authorities to assist harbour improvements. It is believed that the Tyne and similar semi-national works were especially in view in the passing of that very useful Act. The Commissioners have availed themselves of that Act so far as they have been able to do so. They, however, the writer believes, have reason to complain that they have not been granted loans in anything like a fair proportion to the extent of the useful works which they have executed, either as regards the description of the works themselves, or as compared with works executed at other places.

At various times loans have been so granted, amounting in the aggregate to £350,000, at $3\frac{1}{4}$ and $3\frac{1}{2}$ per cent. interest. These loans are in the course of being repaid, and will be so repaid without a shilling loss to the nation. Several applications for further loans have been unsuccessful. In November, 1874, the Commissioners applied for a further loan of £200,000 at the same rate of interest. This application was pressed upon the present Chancellor of the Exchequer, Sir Stafford Northcote, by the united action of all the local Members of Parliament and

other gentlemen of position and influence connected with the locality, but without avail. The original hope of national help held out in 1860 was pointed to, the useful work the Tyne was performing in affording shelter annually to one thousand distressed vessels was strongly urged, as well as the ample nature of the security which the Tyne revenues gave of such loan with interest being redeemed, but all these strong reasons were urged in vain. The Commissioners considered that in making their request, they were putting the claims of the Tyne on the most moderate basis. A sum of money at least equal to the cost of the Tyne piers works—say £800,000—should have been advanced by Government at this low rate of interest, instead of the much smaller sum which they have actually obtained. They could with reason ask more than this, for the piers works alone, without internal dredging and other operations, could not in any sense have made the Tyne a harbour of refuge, and such river works have the most legitimate claim for help; but the Public Works Loan Commissioners invariably have turned a deaf ear to these representations, and will not heed them.

In November, 1877, another and the last of these fruitless applications was made, the Commissioners asking for the loan of £150,000, to be expended on river deepening, and £75,000 towards the completion of the piers—the whole loan to be repaid within

a limited period. The Public Works Loan Commissioners were so averse to the loan being granted, that the application had to be withdrawn, notwithstanding that the provisions of the Harbours and Passing Tolls Act seemed so peculiarly applicable to the case of the Tyne.

CHANGE OF ENGINEER.

Mr. Brooks, who continued engineer to the Commissioners until October, 1858, was possessed of considerable genius and ability, as well as great experience; but his views of the improvability of the Tyne were, unfortunately, so circumscribed, that nothing of consequence could be looked for from his management of the river. He seemed to ignore the capabilities of the Tyne as a great tidal receptacle, and looked principally to the land floods as the power by which any improvement could be got. He did not believe in any substantial deepening or improvement either of the river or the bar. On the occasion of the Harbour of Refuge Inquiry, the Commissioners could not produce him as a trusted witness for the Tyne, but had to rely on Mr. Walker instead, to set forth their engineering case. Mr. Brooks appeared, however, on that inquiry, as an advocate of the claims of other localities. It was evident that the serious divergence of views on all points which now

existed between the Commissioners and their engineer must be ended by separation; Mr. Brooks therefore ceased to be engineer at the time named.

On the 3rd December, 1858, on the motion of Mr. Stevenson, seconded by Mr. Philipson, Mr. John F. Ure, C.E., then engineer to the Trustees of the Clyde Navigation, was appointed engineer to the Tyne Improvement Commissioners. Mr. Ure accepted the appointment, and entered on his duties in the early part of 1859.

During part of that and the following year, Mr. Ure was engaged in taking a complete and exhaustive survey of the then state of the river, its past treatment, and its requirements, with a view to maturing and reporting to the Commissioners on the measures he recommended for affecting a real and permanent improvement.

STATE OF THE RIVER IN 1860.

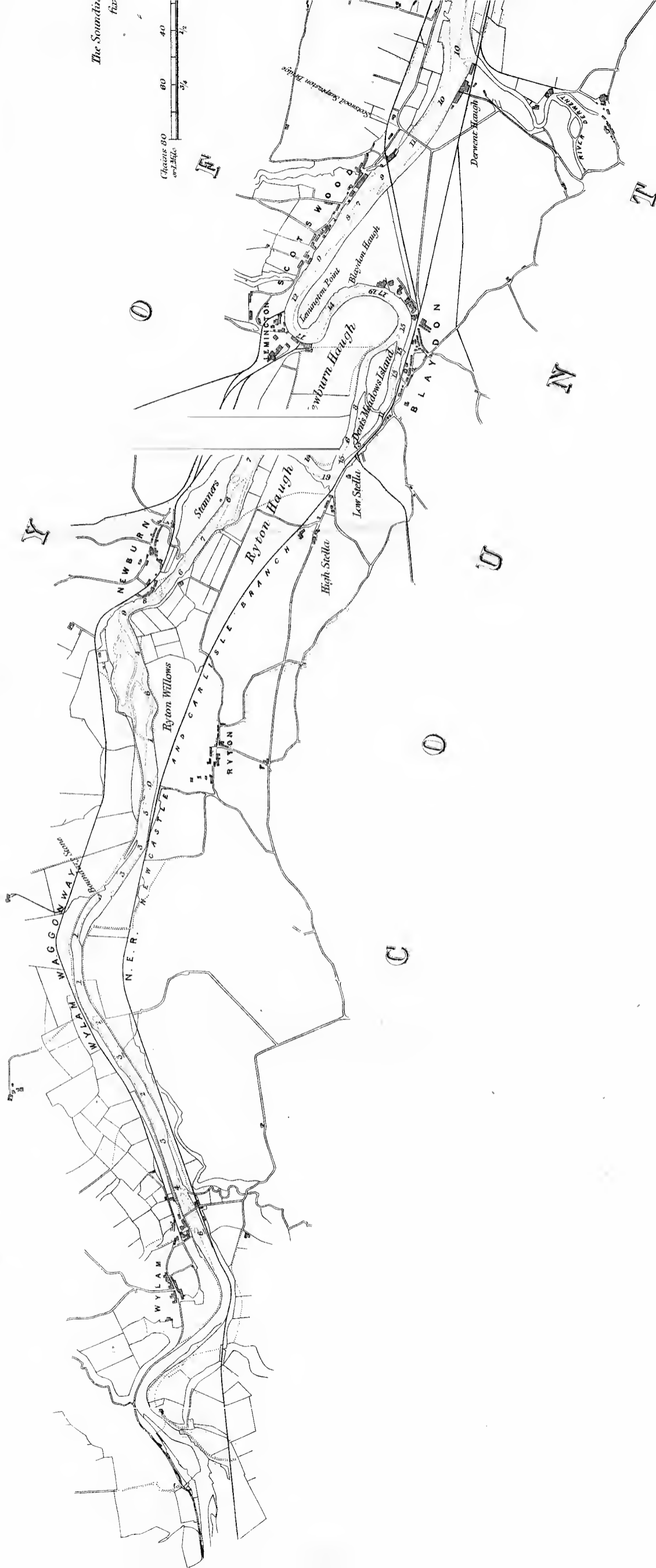
Things at their worst must commonly mend. The Tyne may be taken in 1860, and perhaps 1861, just immediately preceding its improvement, as at its very lowest point of decadence as a navigable river. It might not at that time be absolutely in a worse state than it had occasionally reached previously; but, relatively to the trade carried on, and to its position as regards neighbouring rivers, it was at its

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RIVER TYNE IMPROVEMENT.

CHART OF THE RIVER TYNE FROM THE SEA TO WYLLAM.

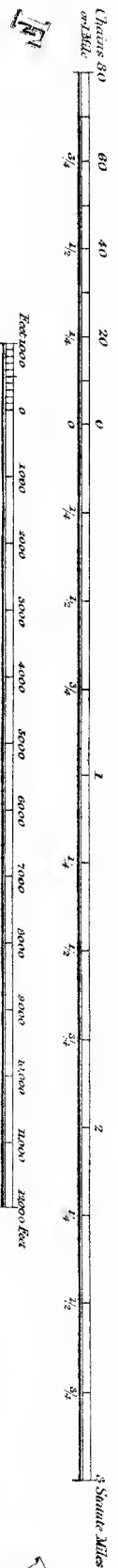
From Surveys made under the direction of *M. J. F. Dye* in 1860

1880.

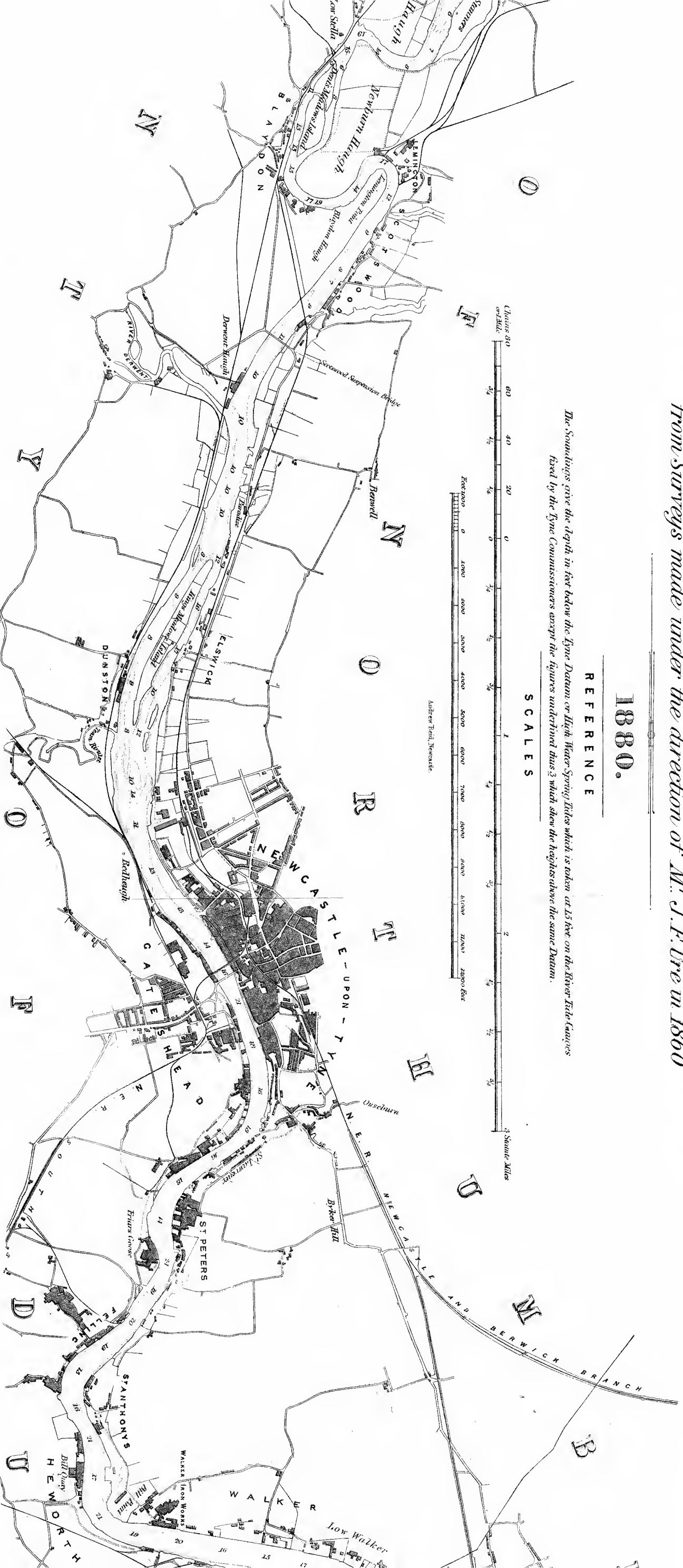
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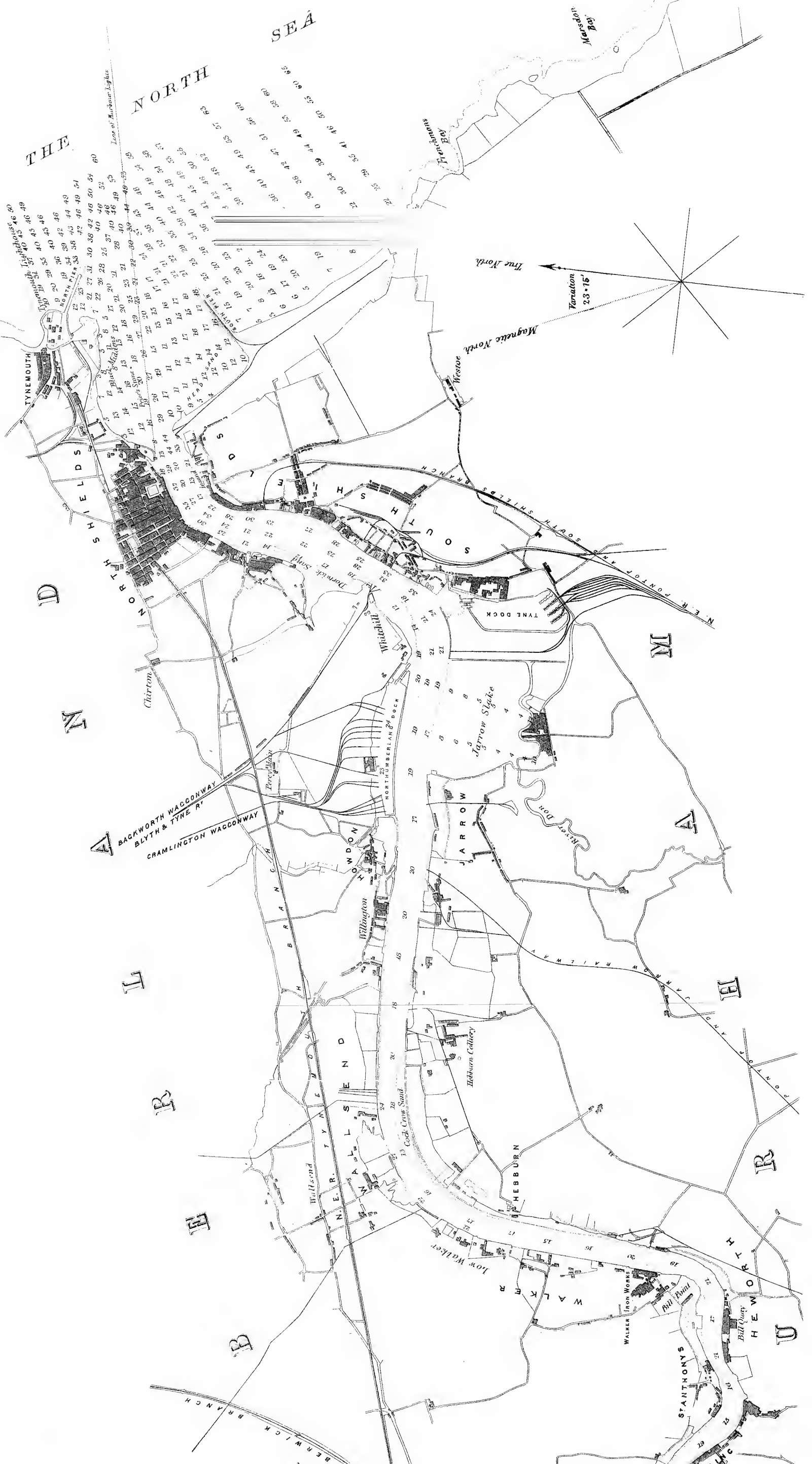
The Soundings give the depth in feet below the *Lyme Datum* or *High Water Spring Tides* which is taken at 13 feet on the *River Tide Gauges* fixed by the *Lyme Commissioners* except the figures underlined thus 3 which show the heights above the same *Datum*.

SCALES



Andrew Reid, Newcastle.





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Line of Meridian Light

True North

Variation
23° 15'

Magnetic North

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BLYTH & TYNE R.
GRAMINGTON WAGGONWAY

NE. R. TYNEMOUTH

WALSLEND

HEBBURN

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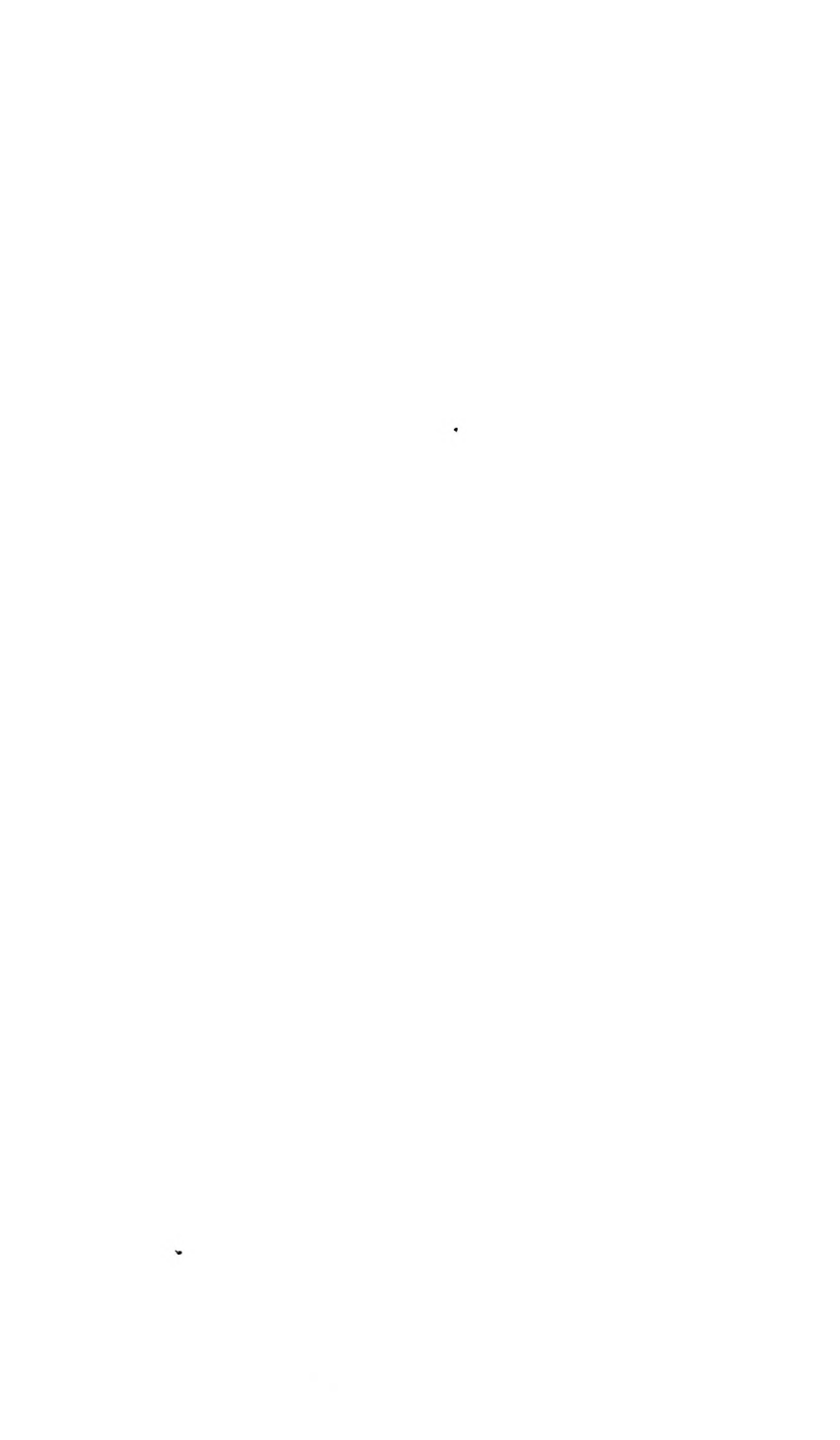
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very worst. Vessels of moderate size and draught were detained for weeks after loading, unable to get to sea *at the top of high water*; other vessels were thumping and grounding on the bar in vain attempts to get to sea; and a state of things existed seriously detrimental, and which, if continued, would have been most disastrous—indeed, ruinous—to the trade and reputation of the port. In May, 1860, three large American vessels all grounded together on the bar, while three vessels of the same size had gone safely into Sunderland. The larger vessels were rapidly deserting the Tyne for Sunderland. The authorities of that port were advertising that the depth of water at the south outlet of Sunderland Dock was *several feet deeper* than the depth at any other port on the north-east coast. Vessels of over 12 feet could only get up to Newcastle at high spring tides. Serious expenses were incurred by the merchants of Newcastle in lightening vessels at Shields, in order to enable them to proceed up the river. “On the 8th June, 1861,” a writer says, “there *lay aground in the channel* at Newcastle, off the 60 ton crane, a valuable schooner (the ‘Edward Beck’) about 100 tons register, and within a few yards of her the steam-tug ‘Sceptre,’ the latter doing all that steam could aid her to do in trying to get off the sandbank which continually impedes the navigation of this place, where certainly vessels of such classes ought

at all times to be able to move." Innumerable instances of a similar character might be adduced, all tending to prove a state of things which it is now difficult to realize. Shipowners, pilots, coalowners, merchants, were all uttering one loud continuous complaint and demand for an improved state of things.

Happily the measures of improvement were on this occasion being devised in a wise and comprehensive spirit, and destined in their application to introduce an entirely new and better state of things.

MR. URE'S PLANS OF IMPROVEMENT AND THE TYNE
IMPROVEMENT ACT, 1861.

Mr. Ure presented a report to the Commissioners, dated 13th October, 1859, being the first of his principal reports, in which he stated that the mode by which he proposed to accomplish the deepening of the river, was by the application of extensive dredging machinery. He described large new dredgers, which he recommended to be constructed, and stated that he had formed the opinion that dredging on a very extensive scale was the only means by which great improvements in the river could be attained. He partly indicated his views as to the general river deepening, which are more fully stated in his report of 29th October, 1860.

In the report just named, after alluding to the enormous traffic carried on in the Tyne, and the material increase that would ensue therein were a good plan of river improvement vigorously executed, he describes the difficulties which beset the navigation. He says:—

With the river in the improved condition, which this report contemplates, the high water will rise higher at Newcastle than at sea, probably to the extent of 1 foot, and about 2 feet at Newburn:

the level of low water will be depressed at Newcastle from 1 to $1\frac{1}{2}$ feet below its present level, and at Newburn probably from 9 to 10 feet; and the tidal wave will be accelerated to an average speed probably of about sixteen or twenty miles per hour; the ebb would be correspondingly increased, and, therefore, there would be a nearer approximation between the period of flood and ebb than is the case at present; and as the sandbanks now exposed at low water would be removed, the low water lowered, and the tidal receptacle well filled and emptied, there would be a considerably increased scour due to the larger quantity of water passing up and down the river each tide.

A traffic of such magnitude as on the Tyne is not carried on on any river of this country except the Thames and the Mersey, both of which are broad and deep compared with the Tyne.

Before proceeding to give a sketch of the plan of river improvement suitable to conduct such a traffic and to accommodate the vessels in which it is likely to be carried, it appears to me desirable that a clear understanding should be arrived at of the difficulties which beset the present navigation.

The first and most important is the want of depth of water on the bar; the next is the narrow and tortuous navigation at the Narrows, caused by the existence of the stones (now being removed), the insand and middle ground; the next the general want of depth of water for heavy ships between Shields Harbour and Newcastle, and the abrupt bends in that part; and from Newcastle upwards want of depth of water at neap tides for vessels of greater draught than keels, and the obstruction of the bridges to the passage of masted ships.

The very great traffic already existing, and the large increase likely to take place, points out the necessity, when considered in connection with the great number of vessels moored in the stream—forming, in fact, a succession of small harbours gradually extending with their increasing trade—of a considerable width of

river to accommodate such vessels, and at same time leave a sufficient fairway for the various classes of passing traffic, viz., steamboats, ships, keels, lighters, &c., &c.

The damage and danger which the frequency of collisions proves to exist to even the smaller class of vessels now using the river at the abrupt bends, such as the Middle Ground, Bill Point, Friars Goose, &c., points out the necessity of easing such bends to the greatest practicable extent as an essential requirement of a good navigation for the safe passage of the existing traffic, and therefore much more so for a larger class of vessels.

In regard to depth, the free use of the river to the larger class of vessels will only be attained when they can immediately proceed to their allotted berths on arrival, or from their berths to sea on being loaded, without detention to the inward bound ships awaiting for tides or lightening to pass up the river, or the outward bound ships waiting in the lower part of the river to take in the last of their cargo before proceeding to sea. A depth to meet these requirements will obviously be considerable; and it appears to me that the plan should be so laid out as to deepen towards the mouth, in order that the great portion of the traffic of the lower part of the river may get to sea before that from the upper part is crowded with it.

I shall now proceed shortly to describe the works by means of which I propose to carry out the preceding views.

The general plan of improvement I propose is to form a channel easily navigable for the largest vessels between the sea and Shields, and docks there, and Newcastle, and for such a class of vessels to and from the upper part of the river as can pass under the High Level Bridge at Newcastle; a sufficient depth of water to be carried to the river walls for the purposes of traders having establishments on the banks.

The depth to which I propose to form the channel is 29 feet at high water of average spring tides (30 feet below Tyne datum)

from the sea up to the Tyne and Northumberland Docks; thence to Newcastle 26 feet; and above Newcastle, to the extent of the Commissioners' jurisdiction, near Ryton, 23 feet. At average neap tides the depth will be about 3 feet less. There will then be a depth at low water spring tides in the channel of about 15 feet up to the Northumberland Dock: from 12 to 13 feet thence to Newcastle; and thence to the boundary stone, near Ryton, about from 10 to 11 feet; these depths to be gradually made to about 10 feet, more or less, as depending on the purposes for which the adjoining banks are used, at such distance from the walls as will leave them secure.

To give a safe navigation and, as far as practicable, uniform channel, I propose to remove various points, and embank parts where unnecessarily wide. These works will cause a more uniform and less retarded current of tide, and therefore produce a more regular and easily navigable channel at these parts. The points below Newcastle are the stones (in course of removal), the Insand and Middle Ground, Whitehill Point, Bill Point, Bill Quay Point, Felling Copperas Works Point, Friars Goose Point, and the smaller points shown on the plan. In the part of the river above bridge, I propose to cut a straight channel between Scotswood and Lemington Hall, and to remove such other projections as will form a uniform channel, gradually diminishing in width to 400 feet between the river walls at the upper part. The Elswick, Lemington, and Blaydon channels to be left open as at present for the traffic of these places.

The river slopes in all cases to be protected by a high water stone facing, and the ground behind filled to a proper height for manufactories, except in the cases of Jarrow Slake and Coble Dene, which it is proposed to leave with sand slopes as at present, unless found liable to be washed away, when they would be protected by a low water stone facing. I would prefer to place a high tide wall along the river line of both the Jarrow Slake and Coble Dene, to

give a truer direction to the currents of flood and ebb; but in that case they would silt up and probably be occupied, and it is with the view of retaining these sites unembanked and unsilted, to be available when required for docks or other public purposes, that I propose the above arrangement.

The river walls opposite factories and other works, I expect, will be built by and at the expense of the adjoining proprietors, as has heretofore been the case.

Outside the Narrows training walls will be required to guide the current more uniformly at that part; but as these are being partially carried out in connection with the piers works, their cost, which will be small, is not included in the estimate.

No doubt, were the river more contracted, a greater depth would be attained by the operation of the tidal and land waters; but, looking to the general requirements for traffic, and the powerful stream necessary to maintain the bar, I am of opinion that the works between Bill Point and Shields Harbour have not been laid out at too great a width. In parts of Newcastle Harbour, it appears to me, too much encroachment has been permitted. This, however, is not so important to the navigation, as the curves of the channel are easy there.

I do not at present propose any lines of wall through Shields Harbour, as a large portion of it may be required for anchorage purposes. I do not, however, see any reason why public quays ought not to be erected suited to the contemplated increased depth of water, which would be better laid out when the time for their construction arrives, the extent and kind of traffic to be conducted at them being then better known, and would probably be to some extent dependent on the depth then obtained up to them.

The river walls below Newcastle are still incomplete, but they are sufficiently advanced to render it improbable that their completion will cause any additional depth of channel.

As the navigation is capable of being extended westward of the

boundary stone, near Ryton, I have not proposed to limit it to that point by the construction of a weir or other restrictive work, but left it to be dealt with as future interests may require.

The improvements just indicated to provide for the trade requirements of the Tyne will, when executed, give to the river a channel greatly exceeding its natural capacity, the formation of which will require to be accomplished by dredging; and after having read and well-considered all the published reports on the Tyne from that of Mr. Rennie till the present time, as well as all the printed engineering and much other evidence taken at the various inquiries of which the river has formed the subject, I am well satisfied that, in addition to regulating the channel, a greatly improved navigation can be accomplished and maintained by no other means; the maintenance required, as explained in a former report, being due to filling up from two sources, viz., the sea sand moved by the waves and carried inward by the current of the tide, and sand brought down by the land floods. The sea sand will cease to be brought in when the piers works are advanced into a depth where the action of the wave will be unable to move the particles forming the bottom; the material brought down by the land floods will require to be dredged as deposited, and will be the source of a constant moderate expenditure; and after these sources of filling up are disposed of, all dredging performed will increase the capacity of the river.

With the river deepened above bridge there would be no difficulty in maintaining a deep harbour at Newcastle; the difficulty at present existing being occasioned by the washing down of the great sandbanks above the harbour into it by the freshes. An extended deep harbour at Newcastle is very desirable, and, indeed, with an increased traffic would almost be essential, seeing that a proper site for docks is difficult to obtain on account of the high ground on both banks, and would be very expensive.

In order that masted vessels may pass to the utmost limits of

the navigation, it is necessary that the bridges across the river be dealt with. These are, the Town Bridge at Newcastle, the Suspension Bridge at Scotswood, and the temporary Railway Bridge recently erected at Scotswood.

As a structure, the Town Bridge at Newcastle acts like a weir, as is proved by the smaller area of waterway through its openings than in the river, both below and above it, and by the increased depth immediately below it and the raised bed of the river above it. With the upper river improved, the contracted openings would act still more prejudicially; for in that case they would prevent the free passage of the larger volume of tidal water and the rapid discharge of the land floods, in which case several of the benefits anticipated would not be accomplished. Besides, it may be supposed from the date of its erection (about 1775) that the foundations are not of the same depth or constructed in the same efficient manner that they now would be, and therefore the additional velocity and fall to pass the increased volume of water through its contracted openings may involve the stability of the structure. Its removal is, therefore, desirable, irrespective of its acting as a bar to the passage of masted vessels.

There are several plans by which this bridge may be dealt with. The first that occurs to me is to remove it entirely, and endeavour to arrange with the North-Eastern Railway Company to make the present High Level Bridge free. If an arrangement with this company may not be effected, I would then propose to construct a new high level suspension bridge as a free bridge; and if this also be found unattainable, then I would propose to construct a new low level bridge in lieu of the existing Town Bridge, on a plan that would enable the two centre spans to be opened for the passage of masted ships.

The Suspension Bridge at Scotswood I would propose to substitute by a steam floating bridge, of which there are numerous examples working satisfactorily throughout the country.

The railway bridge at Scotswood was first erected about twenty-two years ago. It was burned to the water's edge in May last, since which time a temporary bridge with a single line of rails has been erected on the old decayed foundations. This bridge crosses the river at an angle very prejudicial to, and has been constructed on such a defective plan, as to present great impediments to the navigation and to the trade and commerce situate above it. It is not erected on the line laid down on the deposited plans, but is within, or nearly so, the powers of deviation taken by a clause in the Act. I propose that powers be taken to cause the reconstruction of this bridge in a permanent manner, with the foundations so laid as to allow of the river being deepened to at least the extent before stated; that it have two opening spans, one on each side of the central pier; that it be made at a proper angle to the river; and, generally, that it be constructed in such a manner that the navigation interests shall not be sacrificed. There are many such bridges in this and other countries for carrying railways and roads across navigable rivers, canals, dock entrances, &c., and I am not aware of any special reason why such a bridge should not be erected at Scotswood.

As the improvement of the river is to be the means of greatly extending the trade of the port of Tyne, and developing the resources of the district, these improvements to be of service within a reasonable time must be vigorously prosecuted. The amount of dredging to be performed to make the deep channel the full width of the river before stated, will be in round figures about twenty-five million tons; the present machinery of the Commissioners and that being constructed, will remove from $1\frac{1}{4}$ to $1\frac{1}{2}$ million tons per annum, and with two dredging machines of moderate power, additional to those named, I see no difficulty in performing the work in from twelve to fourteen years; if the deep channel of modified width afterwards described were made in the first instance, it would be accomplished in considerably less time.

The rapid establishment of manufactories and other works on the banks of the river, and the probability of railway and other interests acquiring powers to cross it within the jurisdiction of the Commissioners and its limits of improvement, likewise show how desirable it is to perform the river works with every practicable expedition; for dealing with such establishments and interests, if they be allowed to become numerous, may be so costly as to be beyond the means of the Commissioners; and, therefore, the most complete plan of river improvement could not be attained because of the delay in carrying it out.

This exhaustive report of Mr. Ure was most favourably received by all classes. The largeness and clearness of his views, with the practicable nature of the measures he recommended, at once created confidence. It was felt that the Tyne would at last be dealt with by a master hand. The Commissioners proceeded with the requisite steps to obtain from Parliament the means of effecting his comprehensive and able measure of river improvement.

As has been fully seen, no funds at all adequate were available for this purpose, and consequently such must be provided by taxation on shipping and goods using the port.

The Commissioners conferred with the various interests as to the necessary details, finding on all hands, from shipowners, merchants, coalowners, and others, hearty and zealous support, although there were not wanting a few doubters and cavillers who

prophesied evil, and who characterised the finance scheme of the Commissioners as “the proposed waste of money on Tyne river.”

The scheme of taxation adopted was made as moderate as possible, consisting of the abolition of certain old dues called “ship and boat dues,” “groundage and plankage dues,” and “ballast office dues;” the lessening of the dues on ballast taken out of vessels in the port; and in substitution for the dues so given up, and to enable money to be raised, the levying of a tonnage rate on all vessels entering or leaving the port with cargo, it being considered that the proper time for vessels to pay dues was when earning freight. Very moderate dues on certain merchandise exported and imported, which hitherto had paid no dues whatever, were also imposed.

These were the principal features of the financial plan adopted. No additional due whatever was put upon coal, the staple of the port.

As showing the spirit in which the Commissioners’ proposals were received by the mercantile classes, the following copy of a minute of the Newcastle Chamber of Commerce is given, which was, early in 1861, sent by that Chamber to the Commissioners:—

At a special meeting of the Chamber of Commerce of Newcastle, held by adjournment at the offices of the Chamber, on Monday, the 10th December, 1860—W. R. Hunter, Esq., V.P., in the chair—the Secretary having read a full account of the proceedings of the

meeting on the 4th of December (of which the present was an adjournment), and at which meeting the views of the Tyne Improvement Commissioners as to the best mode of providing the necessary funds for the improvement of the Tyne were explained by a deputation from the Commissioners,

It was resolved—

1. The Committee of the Chamber of Commerce so fully recognise the desirability of an early adoption of some definite plan for the deepening of the River Tyne, that they have to express their satisfaction at the able report of the engineer of the River Tyne Commissioners. They consider it unnecessary to comment on the details of this report; but it appears to them that the proposed improvements, as a whole, deserve the support of every well-wisher of this locality.
2. In order, however, to arrive at a solution of the difficulty which stands in the way of the proposed improvements, namely, a provision of the means necessary for carrying them into effect with the least possible pressure upon any class of the community, it becomes necessary to consider who would be benefited by them.
3. This question may be easily answered by stating that the shipowner, the merchant, and the manufacturer, now engaged in commerce, would derive the first benefit, and that the owners of land and property adjacent to the river would ultimately be the principal gainers.
4. This conclusion, if correctly drawn, would suggest that these several classes should bear the burthen of these projected improvements.
5. The proposition of the Commissioners to abolish the groundage and plankage dues is approved, as are also their proposed new rates of taxation on goods imported oversea and coastwise.
6. The tonnage rates on ships bringing or carrying cargo coastwise or oversea, as proposed by the Commissioners, are also approved.
7. This meeting likewise approves of the *ad valorem* rates on the export of goods oversea or coastwise, as proposed by the Commissioners.
8. The proposal of the Commissioners to reduce the ballast dues has also the approval of this meeting.
9. Although the Tyne Commissioners are a distinct body from the Corporation of Newcastle, yet both represent constituencies who have great interest in the improvements of the Tyne: it is therefore to be hoped the Corporation will assist the Commissioners in effecting the proposed improvements.

10. The revenue at present derived by the Corporation of Newcastle, in respect of their five-eighth share of the town dues on coals, &c., amounts to £15,000—a considerably larger sum than it was in 1850, when this division was effected and consolidated by Act of Parliament.
11. This revenue will naturally increase in a greater ratio than heretofore after the river shall have been improved; the Corporation, therefore, would benefit at the cost of the Commissioners without any contribution on its part, if the present arrangement were to be continued. If, however, this body should agree to the transfer of their five-eighth share of the dues to the Commissioners against payment of a reasonable equivalent, the public at large would feel that the Corporation had acted with the consideration which is due to this great and important subject. A case as nearly as possible analogous was disposed of recently in Liverpool; and were the same basis of compensation adopted here, a question which has long created a degree of dissatisfaction would be disposed of for ever, and the town of Newcastle, by increasing its trade, would be amply rewarded by this act of prudence and justice. The ability to pay the consideration would naturally be acquired by the Commission obtaining powers to borrow the requisite amount on the dues they would be entitled to collect.
12. With a view to the improvement of the navigation of the river, it is imperatively necessary that the present Tyne Bridge be removed, and a suitable one on an improved construction erected in its place.

W. H. BROCKETT, Sec.

Another report of Mr. Ure, dated 12th September, 1860, had been received on the subject of the proposed construction of a dock at Tynemouth, commonly called the “Low Lights Dock.”

An additional deep-water dock on the north side of the river was being asked for most importunately by coalowners, shipowners, municipal bodies, railway companies, and others; and as Mr. Ure recommended that powers should be obtained for the works of this dock, the plan was included in the Commissioners’

application to Parliament. As the subject of the position of the Commissioners regarding docks will be more fully explained hereafter under the heading "Tyne Improvement Act, 1872," it is not necessary here further to allude to it, except that the result of including that dock in the Bill was undoubtedly to secure a larger support to the great river improvement scheme on the part of the Shields shipowners, who would otherwise not have agreed so heartily to be taxed for the improvement of the river so many miles beyond their own waters, up to and above the town of Newcastle.

The Tyne Improvement Bill came before Parliament, encountering no opposition so far as the river was concerned, and only slight as affected the proposed dock. Borrowing powers for river and dock purposes respectively were inserted.

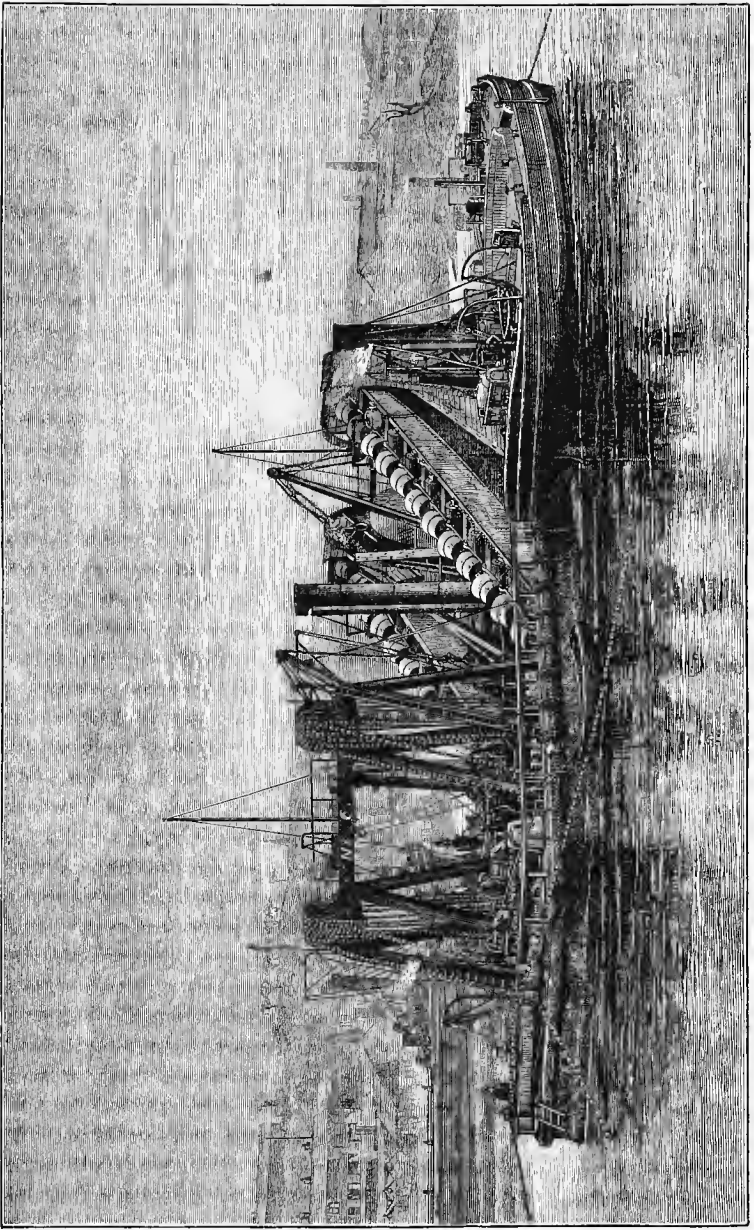
In this shape, and containing many other useful provisions of divers kinds, the Bill became law as the Tyne Improvement Act, 1861. With the exception of a slight increase in the coal dues (to be hereafter noted under the Act of 1872), rendered necessary by the cessation of the payment from Government, the taxation of the port for river purposes as it stood in 1861 remained unaltered till the passing of the Act of 1877.

MR. URE'S IMPROVEMENTS EFFECTED.

WORKS BELOW BRIDGE.

From the year 1861, the improvement of the river made the most satisfactory and uninterrupted progress. The theoretical objections and difficulties which had been urged against Mr. Ure's scheme vanished before the realities of the work done. The old abortive expectations entertained by engineers and others of the river being trained to excavate itself, were disproved by the practical, undeniable excavation effected by the steam dredgers, with the immediate good result flowing therefrom.

In July, 1861, a powerful dredger (No. 4), in addition to three already in operation, was set to work, and in that year the material raised from the bed of the river amounted to the large total of 746,932 tons; in 1862 that quantity had risen to 1,864,564 tons. In July and October, 1863, two new and very powerful dredgers, built on designs from Mr. Ure, commenced working. These two dredgers (Nos. 5 and 6) were undoubtedly the most complete and efficient machines of their class ever constructed. The Tyne now possessed six dredgers, with accompanying steam



One of the large Dredgers on the River Tyne.

tugs, hopper barges, and necessary appliances, being such a dredging plant as no port or harbour of the world had ever possessed. For the expeditious and economical repair and maintenance in efficient order of this valuable plant and machinery, repairing workshops were erected by the Commissioners on their Howdon property. Without this adjunct of Howdon Yard, the works could not have made the rapid and satisfactory progress which they did.

The dredgers operated in various parts of the river; all working, however, to one general plan for the achievement of the great work of removing the cumbrous mass of sand banks and shoals which choked the river from its entrance upwards. The great obstructions in Shields Harbour, the Insand, the Middle Ground, and the Dortwick Sand, were resolutely assailed, and gradually disappeared before these potent agencies of improvement.

In the meantime the piers were gradually extending their arms into the sea, and in 1862 it was thought these piers had made sufficient progress to enable dredging to be done on the bar itself. In the summer of 1863, therefore, dredging was begun on the bar in the most vigorous style, and with wondrously satisfactory results.

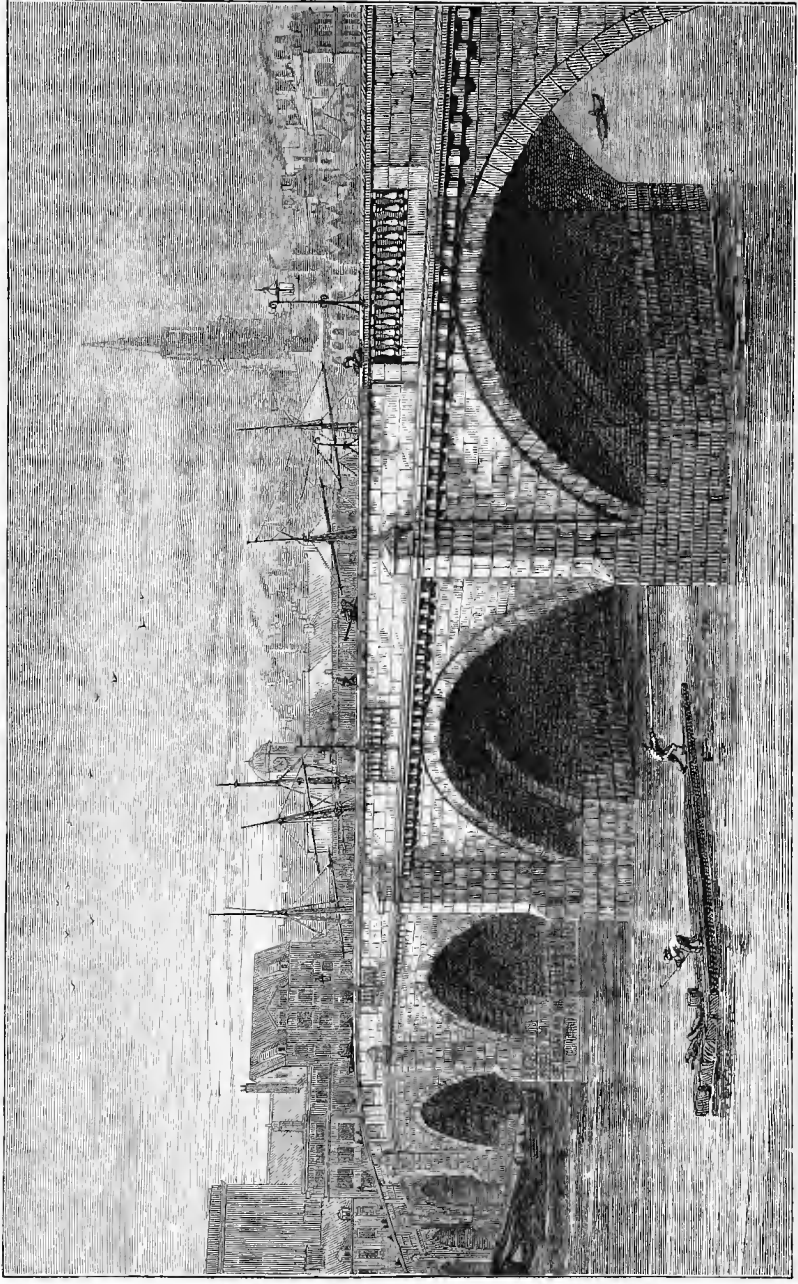
In 1863 the quantity of material raised by the dredgers rose to 2,473,853 tons, and in the following year to 4,180,035 tons; in 1865 it rose to

the unprecedented and extraordinary quantity of 4,545,814 tons, and in 1866 actually reached 5,273,585 tons.

The result of these operations was, that the whole face of things was changed as by a transformation scene. The bar had substantially disappeared; the obstruction at the throat of the river, the "Narrows," had been widened and improved; a broad, fine, deep river had replaced a tortuous and shallow river; a sailing channel was made—with as much depth at low water as formerly existed at high water—right through Shields Harbour up to the docks. The wonderful phenomenon was seen of large vessels riding at anchor at places where just before had been sandbanks, dry many feet at low water; and four vessels were enabled to proceed to sea abreast, where previously one vessel had to pick her careful and hesitating way. The familiar story of ships being detained in the harbour after being loaded for want of water on the bar, ceased to be told; and a clear way in and out of the port at nearly all times of tide was provided for vessels of almost any size.

The deepening progressed upwards. The Jarrow Sands and the Cockrow Sands were assailed in their turn by the all-devouring dredgers, and speedily shared the fate of their neighbours—the sands in Shields Harbour.

There was thus shortly brought to the doors of



The Tynes Bridge.—Removed 1873.

the merchants at Newcastle a depth of 20 feet at low water, capable of indefinite extension if required.

The other principal works, besides dredging, were the taking down the old Tyne Bridge at Newcastle, building a temporary bridge, and the construction of the now completed magnificent opening bridge, whereby masted vessels can freely pass into the higher parts of the river ; the removal of the Bill Point, and some other abrupt points and bends, as well as the formation of training walls.

NEWCASTLE BRIDGE.

The old Newcastle Bridge, with its piers and abutments, occupied one-third of the whole water-way of the river, and caused a difference of level of the river bed above it and below it of several feet. So long as it stood, any comprehensive river deepening was impracticable.

The necessity for the removal of Tyne Bridge, and the re-erection of another which should present less obstruction to the navigation, had been universally recognised. Captain Washington had condemned it *in toto* in 1849, and prophesied its probable fall into the river. Various plans had been previously designed for dealing with it. Mr. Rendel, in his report of 1851, recommended its removal and the construction of an opening swing bridge. A

plan of a bridge was designed by Mr. Brooks in 1854, alongside the High Level Bridge, with its piers occupying the same extent of water-way as its neighbour. It had also a drawbridge at the opening nearest the Newcastle side of the river. This design had many recommendations, giving a roomy spacious bridge of 60 feet wide, and occupying a small extent of the water-way of the river.

The Commissioners had in 1855 a Bill in Parliament to authorise the building this bridge; but the Bill was not prosecuted, principally for want of funds.

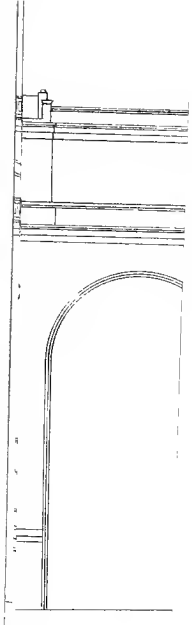
The magnificent High Level Bridge had been constructed by the railway company, and opened in the year 1849. During its erection it had been suggested that it should be so constructed as to leave sufficiently large openings in the stone piers to allow of a low level bridge being thereafter erected, using the foundations and abutments. This, however, was not done. Plans of various kinds were suggested, by Mr. Richard Cail and others, for building the new bridge on a different site. As has been seen, Mr. Ure offered three suggestions in lieu of the old bridge—1st, no new bridge at all, but to purchase, instead, the right of free passage for the public along the High Level Bridge; 2nd, the erection of a new high level bridge on a site to be fixed; and 3rd, to build an opening bridge.

Ultimately the difficulty of dealing with the question of approaches, involving as it did the purchase of property and the diversion of traffic from its old channel, turned the scale, as the same circumstances have so often done in the case of rebuilding very old bridges, and the new structure was commenced on the site of its predecessors—on the old line over which the traffic of so many centuries had passed.

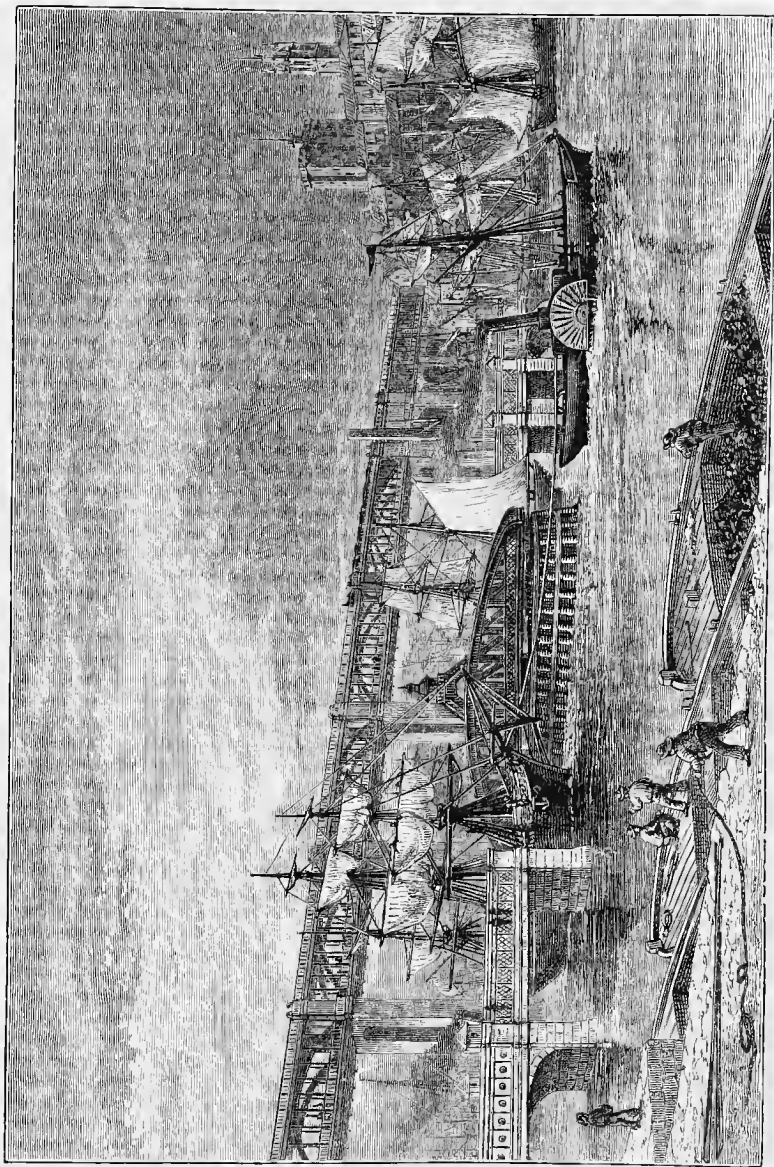
The same questions of site had been mooted and fully discussed on the occasion of rebuilding the bridge on its destruction by the great flood of 1771, with precisely the same result.

It is believed on very substantial grounds that a bridge of wood and stone across the river Tyne was built by the Roman Emperor Hadrian in the second century, although the river was not known by its present name during the Roman period. The river occurs with its present name in Bede's Church History, date 685, and in an old Record of the Church of Durham, under date 875. Roman coins and remains of Roman work, found in the foundations at successive dealings with the bridge, attest that Hadrian's bridge was on the same site as the present. At the time of the Norman Conquest, when William I. came down against the Northumbrians and the Scots, there was no passable viaduct across the river, although part of the old Roman bridge must have been standing. Records show that there was a pas-

sage across in the reign of King Stephen. This bridge, whatever it was, was totally destroyed by fire about 1248. After this, the Corporation of Newcastle and the Bishop of Durham united in building a bridge of stone; and it is amusing to read of the various processes which were adopted to meet the cost, and in after years to keep the bridge in repair. Royal bounties, the collection of alms throughout various dioceses in England, Scotland, and Ireland, the sale of indulgences, and other old-fashioned modes of raising money, were resorted to. Frequently the keeper of the bridge, and the keeper of the chapel of Saint Thomas the Martyr, at the bridge end, were one and the same person, apparently for the convenience of begging alms and benevolences to both objects. Also, in the ordinances of the ancient Guild of Milners or Millers, it is enjoined, "That the wardens of this society should make oath in the chamber concerning the fines, half whereof to go to the support of the Newcastle part of Tyne Bridge." And by the ordinances of the society, anciently consisting of Goldsmiths, Plumbers, Glaziers, Pewters, and Painters, members were sworn on admission "not to interfere with each others occupations; that no Scotsman born should be taken apprentice, or suffered to work in Newcastle, on pain of forfeiting 3s. 4d.; one-half of which to go to the upholding of Tyne Bridge, and the other to the society."



AND REID



New Swing Bridge.

This structure seems never to have been strong or robust, but on the contrary apparently was permanently in a bad state of repair, appealing for renovation to benevolences and charities of every description; yet it contrived, in some shape or other, to prolong its existence for centuries, until 1771. Like many other old bridges, it was not only a viaduct but a street with lines of shops and houses on each side. Originally, this bridge of 1771 was very narrow, but it was considerably widened about the commencement of this century.

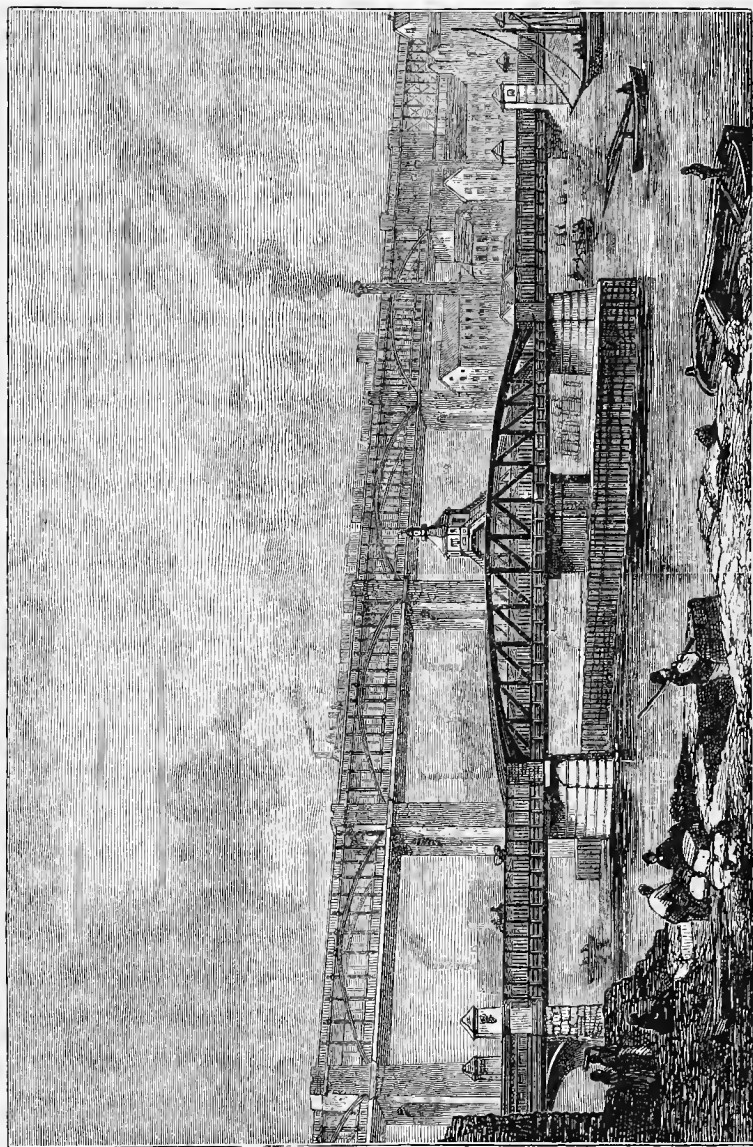
THE NEW SWING BRIDGE.

The opening bridge erected by the Tyne Commissioners consists of four openings, corresponding with those of the High Level Bridge; the two central openings, each 104 feet, are spanned by girders made to swing round and allow masted vessels to pass through up the river. The piers and abutments of the bridge are made of stone and concrete, on foundations of cast-iron cylinders, filled with concrete, sunk down to the rock about 45 feet below low water.

The superstructure, constructed by Sir W. G. Armstrong & Co., is of wrought iron, supporting a carriage road of 24 feet wide, and footways on either side, 8 feet wide.

It was first used to allow the passage through it of the Italian transport ship "Europa," to take on board the 100-ton gun, built by Sir W. G. Armstrong and Co. for the Italian Government. This interesting event cannot be better described than in the words of Mr. James Clephan :—

The Swing Bridge, whose land-traffic had begun on the 15th of June, 1876, was on the 17th of July brought into use as a means of communication between the higher and lower reaches of the river. Tyne Bridge hindered no commerce in the days when soaring masts were unknown to the waters over which it gave a way ; but as "trade's proud empire" acquired increasing sway upon our northern stream, and as, moreover, industrial works extended westward, it gradually became more and more obstructive, till at length the barrier that denied the upper part of the navigable channel ready access to the sea was felt to be intolerable ; and what could be more appropriate than that the engineering victory over this great impediment should be celebrated by a ship of Rome ? It was fitting that the Hydraulic Swing should first be thrown aside for the convenience of a vessel coming to the Tyne from the country of the Emperor who first gave it a bridge. The "Europa" transport, of the Italian Navy, had crossed the seas for a remarkable freight. At the Elswick Engine and Ordnance Works of Sir W. G. Armstrong and Co., the largest gun in the world, casting through the air a missile of two thousand pounds, had been constructed for the Government of Italy ; and in the summer of 1876 it was to be conveyed to its destination. With marvellous smoothness and ease, and silent as the stars, the roadway parted in twain, in the presence of thousands of admiring spectators. The land-passage was broken—the water-way thrown open—and the stately vessel passed the gate. The highway over the river went asunder that



High Level and Swing Bridges.

the 100-ton gun might be taken on board, for transport to the Mediterranean Sea. Rome, who was here with her builder of bridge and wall in the second century, was thus present at the opening of her transformed viaduct in the nineteenth. She inaugurated Tyne Bridge in its primitive condition, and repeated the ceremony in its latest. She was mistress of the world at the former period, and the natives of the land she had subdued were her serfs. In this modern day, when her youth has been renewed, she commissioned the island that once owned her dominion to send her a piece of ordnance, exquisite and powerful, which could not be manufactured at home. Two eras, separated by a lapse of seventeen centuries, were brought together, as the hydraulic door glided softly open for the service of a ship of steam; and who could look upon the scene, with its suggestions of contrast and resemblance, and not be thoughtful? It was a spectacle on our river beyond the dreams of Hadrian, speculative and far-reaching as was the great Emperor who gave our town and bridge a name.

The complete mechanical success of the new bridge is highly gratifying. By means of it the harbour and shipping accommodation of Newcastle and Gateshead can be indefinitely extended.

An engraving of the Old Bridge removed is given, in contrast to the now existing bridge; also, of the High Level Bridge.

BILL POINT WORKS.

The obstruction presented by Bill Point to the flow of the tide and the use of the river up to Newcastle by vessels of large size was of the most for-

midable description. Previous to 1840 the Point extended right into the stream, and two vessels of the then ordinary size could with difficulty pass each other. About the period named the Corporation cut down a portion of the Point by which the sight was much improved, and greater security given to vessels in approaching it; but the rock under water was not removed, and the navigation remained in a most dangerous state. Mr. Ure's designs comprised cutting back the Point, and removing the underwater rocks, thus giving to the river a broad, fine sweep of channel, easily navigable by large vessels, and in unison with the rest of his noble and comprehensive scheme.

A better contrast cannot be presented anywhere than at Bill Point between the appearance of the Tyne forty or fifty years ago and now. Trees and foliage in 1830 were bending down to the water's edge, and natural beauties of every kind abounded in place of the manufactories and smoke which now mark the locality. The natural charms have disappeared, but the bustle of vigorous, active life and industry are, instead, all around.

The following report, by Captain Calver, R.N., shows in the clearest light the great changes which had taken place in the river since 1849 and 1872, and which had converted the Tyne from being a bye-word of neglect and decay into "*the most note-*

worthy example of river improvements within the bounds of the United Kingdom:—

REPORT OF CAPTAIN E. K. CALVER, R.N., ON IMPROVEMENTS
EFFECTED IN THE RIVER TYNE.

London, July 10, 1872.

DEAR SIR JOSEPH,—At the beginning of this year, when a Parliamentary opposition to the Tyne Improvement Bill was considered probable, I made a complete examination of the River Tyne from the sea to Stella with the view of testing its navigable capacity, and I now, at the request of your Secretary, forward a statement of the principal results thus obtained for the information of your Board, so that its members may see what physical changes have been effected in the river since its charge was committed to their hands in 1850.

As you are probably aware, I have executed complete surveys of the Tyne from the Bar to the tidal limit at Ryton, and have also made numerous official visits to the river from the year 1838 to the present time. The most important of these was in 1849, at the period of the Conservancy contest, when, owing to singularly conflicting statements about the depth of the river and its general condition, I was ordered by the Admiralty to enter upon a large-scale and detailed survey of its course up to as far as Newcastle Bridge, basing my operations, for purposes of comparison, upon those adopted by Rennie in 1813, such as positions for cross sections, datum for tidal and other references, &c. What I propose, therefore, to do at present is, to place the result of the survey of 1849 in its principal features before your Board, that it may be contrasted with what I found to exist in the month of February of the present year. The facts of the survey of 1849 were as follows:—

Though 95 acres of the tidal basin of the Tyne, or about $\frac{1}{16}$ th of the high water superficies of the river, had been converted into land, the detached and principal sand-banks had increased in area from 99 to 104 acres.

Notwithstanding this restriction of size, the tidal development was uninfluenced; thus, on the 13th of May, 1813 (two days after the New Moon), the tide rose 14 feet 11 inches at North Shields, and 11 feet 8 inches at Newcastle, while on the 21st July, 1849 (also two days after the New Moon), the tide rose 15 feet at North Shields, and 11 feet 8 inches at Newcastle, or practically the same at the two periods.

Of the 286 sections measured by Rennie in 1813 across the channel of the Tyne between Shields and Newcastle, 69 had increased, and 217 had decreased, the difference being equivalent to the loss on a common spring tide of 34 millions and upwards of cubic feet of tidal water, nearly the whole of which was due to the formation of artificial shores and other works between Jarrow and Hebburn. The above reduction of natural and constantly-acting power is simply represented by a river a statute mile long, 500 feet wide, and 13 feet deep.

The deep water track, or approximate sailing channel, between Shields and Newcastle, had been reduced in average high water depth from 25 feet to 24 feet 4 inches, while navigation was rendered more difficult from the track having become more broken.

The gauge, or the measure and proof, of tidal loss was, of course, to be looked for at the lower part of the river. Accordingly, I found that North Shields harbour was 34 feet narrower and 3 feet shallower than it was in 1813, while its throat, or its restricted entrance, between the Low Light beach and the point of the Middle Ground, was from 30 to 40 per cent. less in its sectional low water capacity.

Lastly, the low water section of the channel across the bar, measured between similar bounding contours existing at the two periods of 1813 and 1849, had diminished a quarter part, viz., from 9,775 to 7,560 square feet.

I afterwards supplied the foregoing facts, as evidence, at the several official inquiries held as to the state of the river, my summary testimony being to the effect, that without the system pursued was wholly changed, and dredging resorted to as a means of improvement, both the river and the industrial and commercial interests dependent upon it must materially suffer.

In 1850, the Tyne Improvement Act transferred the charge of the Tyne from the Corporation of Newcastle to the body of which you are the chairman, consisting of members representing the communities upon its banks, and selected in such proportion as to insure the conservation of the whole river, from the sea up to its tidal boundary. Your Board has subsequently, under proper advice, carried out a systematic plan of improvement, the results of which I now proceed to describe. In what follows, the depths mentioned are, in all cases, those of low water spring tides.

The depth of the channel over the bar, which was 6 feet 8 inches in 1849, had been increased by dredging to 15 feet in 1865, the time of one of my periodical examinations. Now, there is no bar, as a depth of 27 feet exists along the track in from sea, till the proper channel of the river is reached.

There is now a minimum depth of 24 feet in that portion of the entrance channel where the "stones," with 9 feet over them, formerly existed.

The Narrows, or throat of Shields Harbour, has had the width between its high water boundaries increased from 380 to 590 feet to the great advantage of navigation.

In 1849 the lower portion of Shields Harbour, immediately within the Narrows, was nearly wholly occupied by the Middle Ground, and its summit the Insand, 6 acres of the

mass drying at low water. These have been removed bodily, and the Sailing Channel, instead of being restricted as formerly to the narrow and intricate passage along the Low Light beach, now extends completely across from shore to shore, unincumbered by a single impediment. It is interesting to know that a depth of 25 to 30 feet exists over the site of the Insand which dried 3 feet in 1849, and upon which the women of South Shields commonly gleaned a harvest of drifted coal.

In 1849 the Dortwick Sand in the Upper part of Shields Harbour dried for 11 acres of its extent, and confined the navigable channel over towards the quays at South Shields. Now a depth of 23 to 25 feet is found over its site. Some idea may be formed of the remarkable changes which have been effected hereabouts, when it is mentioned that at a spot where in 1849 there was a depth of 6 feet only, the ironclad "Swiftsure," drawing 25 feet, was berthed with 10 feet under her keel when the tide was at its lowest, while the "Wellesley" Training Ship lies in a depth of 28 feet where the sand dried 5 feet in 1849.

Whitehill Sand, which stretched half-way across the channel, has been removed, and a depth of 20 to 24 feet established over its site.

About a mile further up the river Jarrow Sand, 16 acres of which uncovered, and Jarrow Shoal, a usual sticking place to the small passenger steamers plying between Shields and Newcastle, have also been dredged away down to a general depth of 23 and 24 feet. The Slip Sand, a dry patch of 4 acres covering in Palmer's Shipbuilding Yard, has been similarly removed.

Long Reach, about 2 miles in length, has had its 5 feet shallows deepened to 19 and 24 feet. Near to Heaton Staiths is to be found 13 and 14 feet, now the least depth in the

main navigable channel between Shields and Newcastle, a depth, however, which will soon be materially increased by the dredging operations being carried on in the vicinity.

Hebburn Shoal, a 4 feet obstruction in 1849, has been removed, and its site deepened to 26 feet, while 15 to 25 feet is afterwards to be found along the main channel to abreast Bill Point.

The removal of Bill Point, one of the most important of the works undertaken by the Commissioners, has only been partially carried out, but its completion will insure the following results:—It will remove a high projection of the river bank, which has masked the channel above and below it to approaching vessels; it will enable long vessels to round the point with facility; it will improve the form of the permanent channel abreast by reducing the deflection of the stream, while it will promote the passage of the tidal flood towards the higher portions of the Tyne. In 1849 the summit of the high water undulation moved between Shields and Walker at the rate of 13 miles an hour, but only at the rate of 8 miles from thence to Newcastle—a retardation nearly wholly due to the extravagant protrusion of Bill Point.

In St. Anthony's Reach 20 feet and not 6 feet, is now the ruling depth; and St. Anthony's Sand, which formerly uncovered for nearly half the distance across the river, has been entirely removed.

Brandling Reach has had its depths of 5 and 8 feet increased to 17 and 26 feet.

A depth of 18 to 25 feet has been substituted for dry St. Peter's Sand, which formerly occupied three-fifths of the channel. From St. Peter's to Newcastle Bridge the navigable track has been deepened from 8 and 9 feet to about 22 feet on the average.

The channel of the Tyne above bridge is also being deepened, and for the first mile (the limit reached at the time of my examination) the depth had been increased from 2 and 3 feet to 14 feet. It may be noted here that dredging in the upper basin has a value beyond that carried out in the lower portion of the river, as it makes the upper towns accessible to sea-going vessels, and by lowering the low-water surface and thus increasing the tidal reservoir it tends to accelerate the rate of the flood stream the whole of the way from the sea upwards, so as to enable it to supply the extra demand for quantity thus created. It may be stated in other words that just in proportion to the extent to which dredging is carried out above bridge will the necessity for dredging below bridge be diminished.

A wholesale removal of sands and other obstructions, like that described, could not take place without materially affecting the tidal development. Hence I found that the interval between the arrival of the first of the flood at Shields and the time it is felt at Newcastle has been reduced from 2 hours and 12 minutes to 15 minutes, while high water at Newcastle occurs 23 minutes after high water at Shields, instead of 1 hour and 3 minutes as in 1849. The surface of high water at Newcastle has also been raised by the dredging operations about 6 inches, and that of low water lowered 3 feet 6 inches, the depression of the latter being noticed to as far up as Stella, an effect which will be added to after the reduction of the bend in the river course near Lemington (now in progress) has been fully carried out. This marked impression upon the high and low water surfaces of the tidal column represents a gain on a common spring of 77,751,900 cubic feet of tidal water below Newcastle Bridge, and 34,103,880 cubic feet above it, or 111,855,780 cubic feet in all—an amount more than

three times that of the loss which had been sustained between the years 1813 and 1849.

These important changes have been effected by the Tyne Improvement Commissioners principally during the last twelve years under the advice and superintendence of their chief engineer, John F. Ure, Esq. Briefly stated the result is that the Commissioners have by the process of dredging cleared away the Bar—they have freed the throat of Shields Harbour from the obstructions which nearly blocked it up—they have removed seven extensive shoals from out of the channel of the river between Shields and Newcastle, and increased the ruling navigable depth between the same limits from $2\frac{1}{2}$ feet to 13 and 14 feet, while by the consequent tidal gain they have created a power for assisting in the future maintenance of the increased capacity of the river. These results, of national as well as of local importance, establish the Tyne as the most noteworthy example of river improvement within the bounds of the United Kingdom. I congratulate the Commissioners upon this issue, for I cannot doubt that they will readily accept an improved river navigation—increasingly occupied river boundaries—an expanding revenue and a promising future as an ample return for all the trouble they have taken in boldly and persistently carrying out their well-considered plans for river improvement.

I am, very faithfully yours,

EDWARD KILLWICK CALVER,

Captain R.N., Late Admiralty Surveyor of the
East Coast of Great Britain.

To Sir JOSEPH COWEN, M.P.,

Chairman of the Tyne Improvement Commissioners.

We thus see that the River Tyne improvements, though long delayed by circumstances of various kinds for generations, were at length thoroughly

taken in hand and effected up to Newcastle Bridge in a bold and comprehensive spirit by the present conservators.

WORKS ABOVE BRIDGE.

As the dredging below bridge approached completion, dredgers were placed in the river above bridge, carrying as they progressed the deep water into the upper reaches. Unfortunately, from causes hereafter to be described, the deepening operations had to be temporarily abandoned in the summer of 1876. In July, 1877, dredging was resumed, and is now making satisfactory progress in the removal of the sands above bridge. The deep water has been already carried up to near the upper end of the Elswick Ordnance Works.

The great scheme of river improvement inaugurated by Mr. Ure had as one of its essential features the formation of a deepened river above Newcastle, not only for the purposes of navigation, and to open out a valuable district for trade and manufactures, but as a receptacle for tidal water wherewith to scour and maintain the deepened river below. All authorities agreed that the cheapest way of maintaining the river below bridge was to deepen it largely and extensively above bridge; in fact, the sea was to be carried as far as possible inland. The

other works above bridge have been the cutting a new channel of the river to avoid the circuitous bend at Lemington Point, and the widening of the channel of the river at Blaydon, both of which works are now about completed. By the cutting off of another point above Stella, which is in contemplation, these works will have the effect of shortening the river distance from Newburn to Scotswood by three-quarters of a mile. This seems abundantly clear: that the opening out for navigation and industrial purposes of seven or nine miles of deep water river accommodation west of Newcastle, in an enterprising and growing neighbourhood like this, must be of the most beneficial nature, and would more than amply repay the cost of doing it. When we consider the expense and labour bestowed at other places on the formation of artificial harbours, and on dock works on naturally inconvenient sites, it seems inconceivable that a fine natural river like the Tyne, for miles above Newcastle, should be allowed to remain undeveloped.

The experience already gained since the opening of the upper river for navigable purposes by the Swing Bridge, strongly favours the anticipation of an important commerce above bridge, and that the new highway thus utilized will have a most encouraging effect on the rise of manufacturing and other industries, adding thereby to the population, wealth, and importance of the district.

PROGRESS OF THE PIERS WORKS.

Coincidentally with the execution of the river works, the piers works were being pushed forward. The design of the enlarged piers, under the Act of 1859, as given to the Commissioners by Mr. Walker in 1862, was to continue the North Pier into the sea to a depth of 30 feet of low water spring tides, being a total length of 2,900 feet; and the South Pier into the same depth of water, with a total length of 5,400 feet, leaving a distance or opening between the pier heads of 1,100 feet.

On the completion of the works of Mr. Lawton's contract in 1862, disputes arose between the Commissioners and himself as to the amount of money due, and on other points. These disputes were submitted to the arbitration of the late Sir John Rennie, C.E., the late G. P. Bidder, C.E., and James Leslie, C.E. The arbitrators found that a considerable sum was due to Mr. Lawton in excess of the sums which had been certified as due by the Commissioners' engineers.

These differences with the contractor, and the accumulation of the requisite plant for carrying on the works by the Commissioners, entailed a two years' delay, at the end of which the Commissioners proceeded in the execution of the works through their own engineers and workmen. An agreement, however, was entered into with Messrs. Oldroyd and

Marshall, who had gained experience on the works under Mr. Lawton, for doing at agreed-on prices a considerable portion of the labour of the South Pier.

An extraordinary storm took place on the 2nd and 3rd December, 1867, in which the piers works sustained very serious damage. A length of 240 feet of the sea or north face of the North Pier fell into the sea, and 250 feet in length of the harbour wall or north face of the South Pier either fell into the sea or was so injured as to require to be taken down and rebuilt.

The causes of the injury were found to be, that the foundations of the fallen walls had not been placed at a sufficient depth below water to prevent the rubble base on which the walls stood from being acted on and withdrawn from under them by the sea, and the foreshore stones in front were not of sufficient weight and size to enable them to remain unmoved and protect the walls from being undermined by such an extraordinary storm.

The way in which the engineers, Mr. Ure and Mr. Messent, proposed to repair the injured work in a permanent way, and to secure the uninjured part, was to rebuild that portion of the sea wall of the North Pier which had fallen or was injured, laying the foundations 4 feet 4 inches deeper than before, and the foundations of the wall of the South Pier 6 feet 8 inches deeper than before, care being

taken to bond the new properly with, and cement it to, the old work, and to protect the entire length of these walls by a foreshore of heavy concrete blocks of such density and size as to be capable of resisting the action of the sea; those blocks to be of about 36 tons weight each, and with a specific gravity of 12 cubic feet to the ton. An increasing additional depth of foundation was likewise to be given to the solid superstructure in the future extensions of the piers seawards.

The alterations made in the mode of construction of the piers were so important, all in the direction of greater efficiency and security, that the plan of Messrs. Ure and Messent amounted practically to an entirely new design, and differing materially in respect of the foundations and protection of the foreshores of both the North and South Piers from the modes proposed by Mr. Walker.

This unfortunate accident was in many points of view greatly to be deplored. It caused very great delay and great additional expense in the completion of the works. On the other hand, however, it was well that this experience of the effect of a gale of unusual violence was gained at a comparatively early period. Had the works made greater progress previous to such an accident, the results would have been still more calamitous. The writer well remembers a conversation he had with Mr. Walker. Compli-

menting that gentleman upon his piers plans, Mr. Walker replied, with his unvarying modesty and good taste, "I give you in these plans my experience, obtained during a long life spent in enterprises of the most diverse kinds; but I can only give you that, with my judgment thereon. The sea is such a varying element in engineering calculation, and varies so widely in its effects in different places, that you people of Tyneside will have to gain your own experience; and, when that has been gained, you must be guided by it."

The total length of piers constructed up to 31st December, 1879, was as follows:—North Pier, 2,500 feet, with 250 feet of rubble base in advance of the finished work; South Pier, 4,470 feet, with 500 feet of rubble in advance of the finished work. It is contemplated, when the work of each pier shall have so far progressed as to have an opening or distance between them of 1,800 feet, that the working should be temporarily suspended, or progress be made at a slower rate, in order to obtain fuller experience to decide the highly important question of the permanent width of the entrance of the river.

The fixing of the permanent width to be left between the pier heads, and thus the tidal capacity of the river entrance, is the most vital point in relation to the great scheme of improvement, and shows how intimately connected with each other are the various

works being effected. The width of the entrance must have reference to the tidal capacity of the river itself, and this, of course, is again dependent upon both the length of river inland to be deepened and the depth to which such deepening is to be carried. Thus the above bridge improvements and the piers works at the entrance form part of one interdependent whole, the complete success of which is inevitably and of necessity connected with the simultaneous prosecution of the improvements of these two portions of the river.

THE TYNE IMPROVEMENT ACT, 1870—THE TYNE COAL
DUES ACT, 1872—COAL DUES.

As has been shown, by the Act of 1850, five-eighth parts of the town dues on coal were expressly reserved to the Corporation, freed from any liability to contribute to river purposes save only towards the town quay of Newcastle-upon-Tyne.

This arrangement, which was the result of a compromise between the promoters of the Newcastle and Shields Bills in 1850, did not give satisfaction; on the contrary, the continuance of this large amount of river dues to the Corporation, rapidly increasing in consequence of the river improvements, was a fruitful source of irritation and of much entanglement to the Commissioners in their financial operations. In the taxation scheme of 1861, coal was undealt with solely in consequence of the anomalous position it occupied as between the Corporation and the Commissioners.

From the year 1857 much correspondence had taken place between the two bodies with a view to having the whole of the river dues vested in the Commissioners on terms to be mutually agreed on, but without result.

In the year 1858 the Commissioners introduced a Bill into Parliament to authorise the Corporation to sell and the Commissioners to purchase the five-eighth coal dues on such terms as the two bodies might settle. The Board of Trade reported on that Bill to the effect that, whilst it was most desirable that all the coal dues should be in the hands of the Commissioners, the Board thought it would be most imprudent to leave the settlement of the consideration money to the Corporation and the Commissioners, the influence of the Corporation being so very great in the Commission. The Board of Trade also drew attention to the large sums which were annually paid out of the Consolidated Fund for compensation for loss of differential dues. In the passage of the Bill insuperable difficulties arose on this latter subject, and the Commissioners had to withdraw the Bill.

From that time till the year 1870, nothing definite took place, when a Bill was introduced into Parliament authorising the transfer to the Commissioners of the whole of the river dues. This resulted in an arrangement being come to that the Corporation should be paid a sum of £130,000 as compensation for the loss of their interest in the dues.

It is necessary to explain the history of this coal due, in order that the reader may fully understand the position. We will begin with the year 1825.

At that time the Corporation levied a due on the export of coal in British ships of 2d. per chaldron, and on coal exported in foreign ships of 1s. 4d. per chaldron. About that time the reciprocity treaties were being entered into with foreign nations by the British Government, whereby the dues on privileged vessels—that is, vessels belonging to the nations with whom we had treaties—were to be the same as on British vessels. Not to deprive the localities, however, which had the right to levy such differential dues of their revenues, thereby making such localities pay for imperial action, the Government undertook to pay to the different harbours the difference between the rate on British vessels and what would, but for such treaties, have continued to be levied on foreign vessels. In the Tyne, the 2d. per chaldron was collected on all coal exported, an account being transmitted to Government periodically of the quantity exported in foreign ships, and the amount of the difference between the British rate and the foreign rate on such coal was paid to the Corporation out of the national consolidated fund; that is, 1s. 2d. per chaldron was paid. In the year 1846 the Corporation by resolution reduced the foreign rate from 1s. 4d. to 8d. per chaldron, so that from that time the differential rate received from Government was at the rate of 6d. per chaldron. This continued until the year 1861, when the Harbours and Passing Tolls Act was passed, which abolished all differential rates,

but which provided for the payment of a ten years' compensation to the places so deprived of such differential rates. The amount of this annual compensation in the case of the Tyne was fixed at £8,185 15s. 4d., the payment of which would expire at the end of the year 1871. Of this, of course, five-eighths was appropriated to the Corporation and three-eighths to the Commission. When the arrangement was come to in 1870 between the Corporation and the Commissioners there was only one year's compensation to be received.

The Tyne Improvement Act, 1870, passed, vesting the whole of the coal and all other river dues in the Commissioners, both with respect to collection and appropriation of the same.

The Harbours and Passing Tolls Act provided that the localities deprived of these differential rates should, after the time when the compensation ceased to be paid, have power by order in Council in certain cases to indemnify themselves by raising other of their rates to an equivalent amount to make up the loss.

In the year 1871 the Commissioners applied to the Privy Council for leave to raise the coal due from 2d. to 3d. per chaldron to make up the then impending loss. This application was opposed by certain coalowners and merchants, and finally resulted in the passing of the Tyne Coal Dues Act, 1872, whereby the ancient due was abolished, and in lieu

thereof a new due of 1d. per ton imposed upon the export of coal.

The 2d. per chaldron was equivalent to about $\frac{3}{4}$ d. per ton. The additional farthing imposed is the only addition to the tax on coal which had been levied to pay for the river improvements until 1877; and in considering any advantage which the river funds derived from it, there had to be deducted the loss of the differential due, to replace which it was imposed.

It was satisfactory, however, to have a long pending and irritating question settled as between two great public bodies such as the Corporation and the Commissioners, each in its own sphere labouring for the public good.

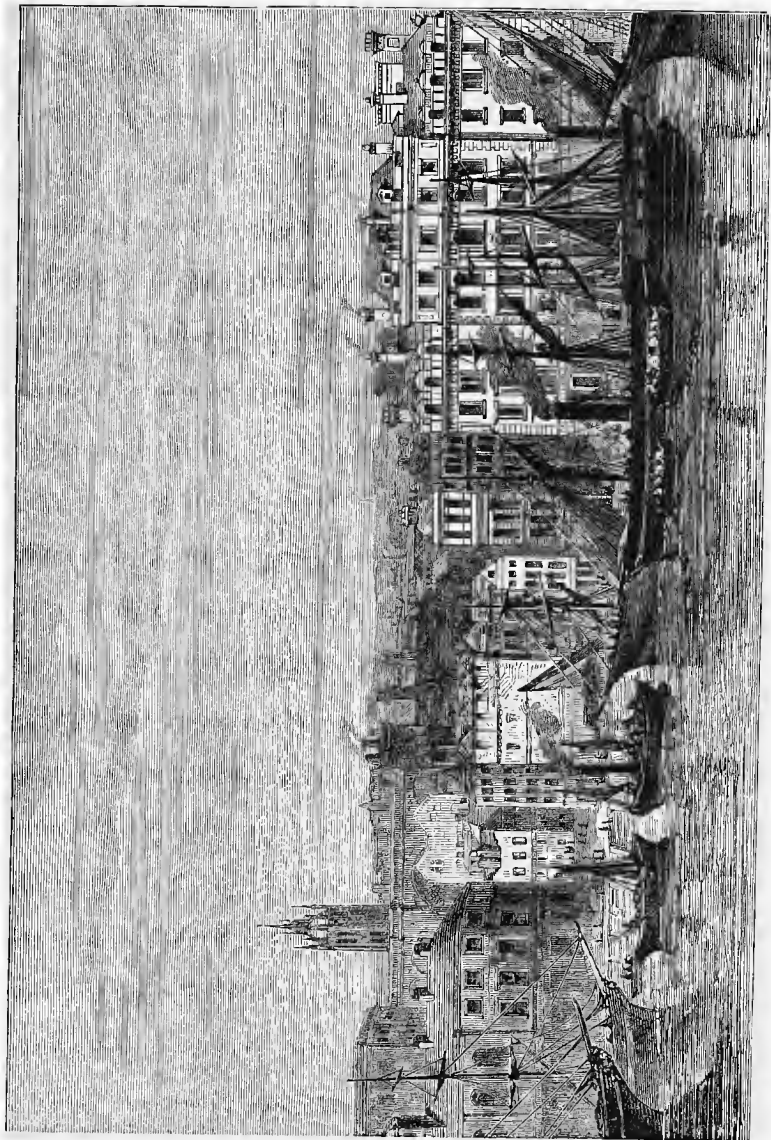
The Corporation were legally entitled to all the dues the town got from the river, and undoubtedly applied them in the way conceived best at the time; but in the light of the present day it would seem to have been the most far-seeing and best paying course for the Corporation to have expended such moneys in improving and developing the resources of the river and harbour. Had the Tyne been improved fifty years ago, trade which has since been attracted to and settled at neighbouring ports would have come to the Tyne, and the town would have been proportionately larger, wealthier, and more prosperous.

THE PUBLIC QUAYS.

At the time when the Corporation lost their five-eighth coal due, the town was called on to meet a large expenditure on the rebuilding and extension of the quay of Newcastle. The deepened river necessitated for its utilization that quays should be founded in a greatly increased depth; and the increasing commerce of Newcastle required that the length of its quay should be extended. The Town Council proceeded in a public-spirited manner to comply with both those demands, and have expended a large sum, estimated roughly at half-a-million sterling, on their quay works below bridge. The project of a quay on the north side of the river above bridge had also been at various times before the Council; and doubtless all necessary provision will be made for the accommodation of the ever-expanding trade carried on at Newcastle.

The Gateshead Corporation, after the great fire of 1854, obtained powers, and afterwards constructed a public quay in front of that town.

By the land arches on each side of the Swing Bridge, provision has been made for the connection of any extensions of the town quays at Newcastle and Gateshead above bridge with those below bridge.



Quayside, Newcastle-upon-Tyne.

Both the Corporations of South Shields and Tyne-mouth are likewise now in possession of public quays of limited capacity, but which will no doubt be enlarged as growing necessities require.

A valuable and increasing trade in herring and white fish is carried on at the public quay at North Shields, an incidental consequence of the improvement of the entrance.

TYNE IMPROVEMENT ACT, 1872.

COBLE DENE DOCK.

As has been already stated, the Tyne Commissioners first became dock proprietors through the peculiar circumstances connected with the origin of the Northumberland Dock. To prevent a large and uncertain outlay on the river fund in carrying into effect Mr. Rendel's plan for a half-tide dock to preserve the shipping places at Hayhole, the Northumberland Dock was projected and formed. When the Tyne Improvement Bill, 1852, was before Mr. Walker, the Admiralty inquirer, the position of the dock was strongly objected to by many as being too far up the river; but the argument seemed unanswerable, that where the trade was, there should be the dock. The Commissioners having taken in hand this undertaking, it followed almost as a matter of course that the provision of all requisite dock accommodation on the north side of the river should fall into their hands; for, having induced capitalists to embark large sums on the sole security of the dock dues, it was their duty to see that such security was not needlessly imperilled. In the year 1853 a project

was before Parliament for the construction by a company of a dock at the Low Lights, with a railway therefrom into the colliery districts. That project was defeated on the evidence of its own promoters, principally on the ground of the great danger of the dock wall conducting heavy seas into Shields Harbour.

Another project was before Parliament in 1856 for a dock at the same place, but withdrawn. In the year 1845 an Act had been passed for the construction of a dock in the Coble Dene by a company. This dock had not been constructed, and the project lapsed. In the year 1857 the Commissioners applied for and obtained powers for the construction of a dock at the Coble Dene, with a junction with the Northumberland Dock. This Act, from various causes, expired, and no dock was formed.

The demand for another dock on the north side of the river, however, continued to increase in intensity. In the years 1859 and 1860 the Commissioners were importuned by memorials and representations from the coal trade, merchants, and captains of vessels belonging to London and Newcastle, town councils, shipowners societies, the Blyth and Tyne Railway Company, &c., urgently to this effect. The subject was referred to the engineer, Mr. Ure, who reported in favour of a Dock at the Low Lights and said, "that although he was of opinion that the dock should not

be proceeded with until the piers were sufficiently advanced to make the necessary quiet within them, to prevent any range being conducted by the dock wall into the harbour, yet, assuming the piers works to be sufficiently forward, he thought the preliminary steps might be taken for the construction of the dock, and that the time might arrive when the dock might be safely proceeded with."

On the receipt of Mr. Ure's report, queries were addressed by the Commissioners to the various town councils, coalowners, shipowner societies, chambers of commerce, and other kindred bodies, asking them to say distinctly if in their opinion another dock was wanted, and if so, which site was preferred. Although the answers varied much as between the Coble Dene site and the Low Lights site, there was almost perfect unanimity as to the pressing necessity for another dock.

The construction of the Low Lights Dock was authorised by the Act of 1861. The Commissioners thereupon communicated again with all the interests to be benefited, with a view to obtaining guarantees of traffic. Sufficient guarantees were not forthcoming. The Tyne Improvement Act, 1865, was therefore obtained, which legalised guarantees of capital by the coalowners, the way-leave-rent owners, the Blyth and Tyne Railway Company, and the Corporations of Newcastle and Tynemouth. From that time,

however, the scheme collapsed. Difficulties financial interfered to prevent the dock being made. Insuperable nautical objections arose, including the old fear of the dock wall conducting seas into the harbour. After the wreck of the "Stanley" and other vessels at the entrance of the river in the latter end of 1864, the Blyth and Tyne Railway Company intimated that in their opinion the dock could not be safely constructed on the site where the foundation stone had been laid. In order to prevent the powers of the Act of 1861 from lapsing, the works of the dock had been commenced by laying the foundation stone and doing some other preliminary works in June, 1864.

In the year 1867 the Commissioners obtained the Act for the formation of railways communicating between the Northumberland Dock, the Blyth and Tyne Railway, and the different colliery railways, and for the construction of improved shipping places outside the dock, designed to load the largest class of vessels. The Act also authorised the acquirement of a large quantity of land adjacent to the dock to be used for railways, standage ground, and general wharfage and storage purposes. Some time elapsed before these works were undertaken; but they are now in operation, and their capabilities for giving useful accommodation to trade are being gradually and satisfactorily developed. The coal-shipping arrangements at these staiths are the most perfect of

their kind, comprising every modern facility for the rapid loading at all times of tide of the largest vessels. A drawing is given showing one of the old-fashioned shipping spouts as contrasted with those now mentioned.

The demand for another deep-water dock on the north side of the river, however, continued; and as the river deepening was realized, it was required that this dock should have its foundations laid in a depth corresponding to the improved river. Both the Northumberland and Tyne Docks had been made previous to the river improvements, their sills having on them only a depth of about 10 feet at low water, whilst the depth of water in the river at low tide was considerably upwards of 20 feet.

It was represented that all the objections as to site could be got over by making this dock in the Coble Dene instead of at the Low Lights, and that the powers with respect to the latter site should be transferred to the former. The Commissioners, convinced of the necessity for additional dock accommodation of a nature suitable to the improved state of things, and believing such accommodation the only means of attracting valuable trade to the port, resolved to apply to Parliament for the necessary powers. In this they were supported by the almost unanimous voice of the district, as doing what was pre-eminently calculated to enhance the usefulness and trade of the

port by making provision for a valuable import and export trade additional to the staple of coal.

In October, 1871, Mr. Ure, at the request of the Commissioners, presented a report setting forth a complete system of extended dock accommodation. The plan, to be executed in sections as trade required, comprised:—

1. A river quay wall, extending from the east end of the quay outside of the Northumberland Dock to the Coble Dene.
2. A dock in Coble Dene of 46 acres with main entrances 100 feet wide, and a lock 60 feet wide from a tidal basin of $4\frac{1}{2}$ acres.
3. An extension of Northumberland Dock of 16 acres.
4. A ship canal connecting the two docks, thus forming one entire dock system.

Although this scheme was not fully adopted, Mr. Ure's recommendations were kept in view in the Parliamentary application.

A dock at Coble Dene was designed by Mr. Ure and Mr. Messent, having a principal entrance with 15 feet at low water on its sills, and a lock with foundations placed in 22 feet at low water, capable of being used for locking in and out large vessels even at dead low water. It was so laid out as to be capable of future extension towards, and ultimately to communicate with, the Northumberland Dock.

The whole of the land required for the purposes of the dock, and for the accommodation and development of its traffic, was preliminarily arranged to be obtained from His Grace the Duke of Northumberland, who was induced to sell to the Commissioners so increasingly valuable a portion of his estate in consideration of its being devoted to this great public purpose.

The borrowing powers, amounting to £600,000, which had been previously obtained for the Low Lights Dock, were by the Bill transferred to the Coble Dene Dock; and no additional capital was required to be authorised for the purpose. Like the scheme at the Low Lights, the capital of the intended dock was to form part of the Northumberland Dock Fund.

CONSOLIDATION OF BORROWING POWERS.

In the early days of the Commission, especially during the construction of the Northumberland Dock and before the old unbelief in the reality of the Tyne improvements had been dispelled, the Commissioners were obliged to pay comparatively high rates of interest for loans.

This state of things, however, with the progress of the improvements, passed away, and money came to be easily obtained. But then another technical

impediment gradually arose. In consequence of the numerous Tyne Improvement Acts, and the successive additions rendered necessary from time to time to the Commissioners' borrowing powers, these powers became so complex that simplification and consolidation became absolutely necessary. Not only were there four distinct and independent funds to explain to lenders, but three of those funds had each different borrowing powers of its own. A statement was submitted by the Secretary to the Commissioners drawing attention to this state of things and suggesting consolidation of powers. All the recommendations contained in that memorandum were adopted and incorporated in the Bill, which became law on the 18th July, 1872, as the Tyne Improvement Act, 1872.

This simplification and consolidation of the borrowing powers has proved of the greatest advantage. Everything that savours of complexity and restriction raises doubts, and uselessly impedes the easy raising of capital; but with a simple power of borrowing equal to the requirements of the case, the Commissioners, with their splendid river and docks and the ever expanding commerce of the Tyne, ought to obtain money at as low rates as any other harbour or great trust of the United Kingdom.

VARIOUS MATTERS.

NORTHUMBERLAND DOCK RATING.

In the original estimates of revenue and expenditure of this dock no account was taken of its liability to pay local poors' rates and district rates. Up to that time the law courts had upheld the principle, especially in the case of the Liverpool Docks, that where there was no beneficial occupation, there was no liability to poors' rates—a non-beneficial occupation being a public undertaking carried on by corporations or other representative bodies, who simply levied rates and paid the liabilities of the trust without dividing dividends, or any individual deriving personal proprietary profit therefrom. The Northumberland Dock being purely of this description, viz., an undertaking for the public interest, the Commissioners appealed against the first assessment made on the dock by the overseers of Chirton. The case came on for trial before the Court of Queen's Bench in 1859, when the liability of the dock to rates was affirmed, the judgment being given by the late Lord Campbell. Various proceedings afterwards took place to define the always indefinite question of

what a concern would let for to a tenant which never is let to a tenant, the final result, however, being that the Dock Trust has had to pay annually for many years nearly £4,000 in the shape of Chirton poors' rates and Tynemouth district rates. The borough of Tynemouth has, of course, benefited to this extent as well as to the extent of the additional rateable value conferred by the dock works on the surrounding lands and properties. The Liverpool Docks have, however, now long being made rateable, and the exemption of non-proprietary undertakings practically abandoned. The dock has fortunately proved so thoroughly successful and remunerative, that this additional impost on its working has not prevented it from proving one of the best paying and successful docks in the kingdom.

PURCHASE OF SHIELDS STEAM FERRIES.

In the Parliamentary Session of 1862 a Bill was pending for the incorporation of the Tyne General Ferry Company to run passenger steamers on the river, calling on the way at various landing stages proposed to be erected on each side of the river.

The monopoly of the North and South Shields Ferry Company of the right of ferrying over the river between the sea and Jarrow somewhat interfered with the proposal of the new company to convey

passengers from one side of the river to the other, in the zigzag voyage of a steamboat calling at stations on each side. Previous to the passing of the Bill into law, clauses were inserted for the purchase by the Commissioners of the undertaking of the Shields ferries in the public interest, but their monopoly was modified to the extent that it should not apply to any case in which the ferrying across the river within the prescribed limits took place, in the course of a voyage or trip commencing or ending at any place beyond those limits.

In 1863 the amount of purchase money to be paid by the Commissioners was fixed at £39,000, by arbitrators appointed in pursuance of the Act, and thereupon the ferry undertaking passed into the hands of the Commissioners.

TYNE IMPROVEMENT ACT, 1866.

This Act made certain alterations in the mode of levying the piers dues. It abolished exemptions which had till then existed of sailing vessels being free for the year after paying dues seven times, and steam vessels being free after paying fifteen times. Practically, there were scarcely any sailing vessels which enjoyed exemption, whilst the exemption of steam vessels was very great and increasing, some actually being free for the year from the months of

February and March. The Act also conferred further powers for raising additional capital for the piers works.

SIR JOSEPH COWEN, M.P.

In this work care has been taken not to obtrude references by name to individual gentlemen, or in any way, invidiously or otherwise, to make personal allusion to any of the persons who in their several parts have all been doing what they thought right in river matters; but one special reservation must be made, to pay a passing tribute to the gentleman now named. On the 19th December, 1873, died at Stella Hall, Sir Joseph Cowen, M.P. for Newcastle-upon-Tyne, and Chairman of the Tyne Improvement Commissioners. Sir Joseph had been Chairman from November, 1853, until his death, and was consequently identified with its proceedings during the whole of that period. He had taken a very active part in the preliminary steps which constituted the Commission, and ably pleaded the claim of the up-river interests before the Parliamentary Committee in 1850, on which occasion Mr. Clayton facetiously complimented him as "Mr. Sergeant Cowen." Mr. Cowen was one of the life commissioners named in the Act. He was a very worthy man, of a pleasing presence, and an unaffectedly amiable and generous disposition. His aptitude and love for public work was wonderful,

displaying a remarkable power of welding together and getting discordant elements to move harmoniously. For a great many years he devoted a very large, if not the major, portion of his time to river affairs; and altogether he was one of the noblest specimens of that best type of British citizenship wherein men of wealth, ability, and leisure devote their self-denying labours with purity and single-mindedness of purpose to the public weal. In 1865 he was elected Member for Newcastle by the largest number of votes ever up to that time recorded, and again elected in 1868. In November, 1871, he received the following letter from the Prime Minister, Mr. Gladstone:—

10, Downing Street, Whitehall,
Nov. 21, 1871.

DEAR MR. COWEN,—Allow me to tender you, with Her Majesty's approval, the honour of knighthood, in acknowledgment of the public service which you have rendered for so long a time, and with so much ability, as Chairman of the River Tyne Improvement Commissioners.

If it be agreeable to you to accept this proposal, it will be very gratifying to me to have tendered it.

I remain, with sincere respects,

Faithfully yours,

W. E. GLADSTONE.

JOS. COWEN, Esq., M.P.

At the earnest request of many friends he accepted the proffered honour of knighthood.

In the death of Sir Joseph Cowen, the Commission lost an excellent Chairman, and the district a good and honoured name; whilst the writer sincerely mourned the severance of association with so excellent and good a friend.

TIMBER PONDS ON JARROW SLAKE.

In 1872 the Commissioners arranged for the purchase from T. D. Drewett, Esq., of the freehold in 87 acres of land forming part of Jarrow Slake. This land was afterward taken possession of, and laid out in ponds or divisions of suitable size, for the accommodation of the timber trade of the port. It is also in contemplation, and arrangements have been made, to obtain the necessary land to connect such timber ponds, by a short branch railway, with the North-Eastern Railway, thus putting them in direct communication with the railway system of the kingdom.

THE TYNE COMMISSION AMENDMENT ACT, 1875.

In the session of 1872 a Bill was introduced into Parliament which set forth in the preamble that the constitution of the Commission was not so favourable to the interests of the port "as it might be if such Commission were placed on a more extended basis." The Bill proposed to add an additional number of thirteen to the then existing number of Commissioners, and it provided for the creation of a variety of constituencies for the purpose of electing the new Commissioners. It did not allege any dereliction of duty, or want of efficiency in the working of the existing body; neither was the Bill the outcome of any public meetings, or remonstrances, or complaints of grievances.

This Bill was withdrawn by its promoters; but in the session of 1874 another was introduced with the same recital, which proposed to add fifteen additional Commissioners to the then existing number. These new Commissioners were proposed to be allotted amongst shipowners, coalowners, traders, local boards, and others. The Bill did not allege any want of efficiency in the Commission as then constituted; nor was it, as in the case of the Conservancy Bill of 1849,

the outcome of a long series of complaints and grievances. In the early part of 1874 an influential deputation of merchants, shipowners, and traders, waited on the Commissioners in support of the Bill, when it appeared that the promoters really desired that a certain number of representatives should be admitted into the Commission from the shipowners, coalowners, merchants, and dues paying interests.

Whilst the Commissioners did not think any special good would result from the proposed change, they were unwilling to set themselves against any strongly expressed desire of the locality for a representation of dues payers.

In consequence, negotiations were entered into between the Commissioners and the promoters, with the result that, in April, 1874, an agreement was come to—

1. That the Commissioners recognised so much of the principle of the Bill as embodied the representation on the Commission of the payers of dues, and that for that purpose there should be an increase in the number of representatives.
2. The Commissioners to introduce and support a Bill in the then ensuing session to provide for an extension of the Commission by adding six additional members, thus increasing the number to twenty-four, to be ultimately dimin-

ished to twenty-two on the death of the two nominated members appointed by the Act of 1850; the power of electing the additional members to be given to the payers of dues to the Commissioners under the following classes, each class electing its own representatives separately, viz. :—

Class 1. Shipowners.

„ 2. Coalowners.

„ 3. Due-payers not included in the foregoing classes.

3. All other questions that may arise as to the amount and nature of qualification of payers of dues as voters, the distribution of the new members to be added to the Commission amongst the various classes of due payers, and the manner in which such new Commissioners are to be elected, to be mutually agreed upon between the Commissioners and the committee of promoters of the present Bill; or, in case of their non-agreement, these questions shall be settled in committee of Parliament on the proposed Bill.
4. The promoters of the present Bill undertake to assist the Commissioners in opposing any increase in the number of Commissioners beyond the six additional Commissioners, and

any mode of representation other than that provided for.

5. That the Commissioners will not apply to Parliament for any increased powers of taxation until the session following that in which they shall have introduced and endeavoured to carry such a Bill.
6. The Bill of the present session to be withdrawn immediately on the acceptance of those terms by the Commissioners.

The Commissioners consented to and accepted these terms, and thereupon the Bill was accordingly withdrawn by its promoters. In pursuance of this agreement, the Commissioners introduced and promoted a Bill in the session of 1875 for the extension of the Commission by the addition of six representatives, to be elected by the payers of dues, which passed into law as the Tyne Improvement Commission Act, 1875, and provided that these representatives should be elected as follows:—

By Shipowners	...	...	...	...	2
By Coalowners	...	...	...	...	2
By Traders	...	...	...	...	2

The term of office of the new Commissioners to be three years.

Provision was also made for the election of an

auditor of the Commissioners' accounts by the dues payers, whose term of office should likewise be three years.

The necessary provisions were made for the qualification of electors, for the preparation of lists of electors, for holding elections, and other details necessary to carry the Act into effect.

The first election under the Act, of Commissioners and Auditor, took place in September, 1875.

THE TYNE IMPROVEMENT BILL, 1876.

We have seen that hitherto the moderate taxation imposed on the commerce of the port in 1861 for river purposes had sufficed to enable the Commissioners to carry on the river improvements on a grander scale, and with more beneficial results, than designed or anticipated in Mr. Ure's original plan. When these improvements had made certain progress, it was found practicable, and eminently desirable, that the deepening of the river should be effected to a greater extent than contemplated. Mr. Ure's plans of 1861 embraced dredging a channel from the bar upwards through Shields Harbour to the entrances of the Tyne and Northumberland Docks, with 15 feet depth at low water, and from the docks up to Newcastle with a depth of 12 feet at low water. The channel really excavated, however, was 24 feet deep at low water up to the docks, and substantially 20 feet up to Newcastle—a depth of 18 feet at low water being carried up above Newcastle Bridge, to the extent the dredgers had reached at the time they were suspended from working. The channel, also, in many places, especially in Shields Harbour, was made broader, and consequently more extensively

useful than designed. The dredging on the bar had also been carried on to an extraordinary degree. The result of all this was, that actually three times the quantity of material had been taken up from the bed of the river than had been estimated for in 1861. Besides, as has been shown, the Newcastle Bridge had been executed in a vastly superior, more costly, and altogether different style.

Notwithstanding these causes, however, the increase of trade was so great, and the revenues of the Commissioners of so expensive a character, that had other causes, over which the Commissioners had no control, not been in operation, there is no reason to doubt that the river improvements, vastly increased and extended as they had been, would have been completed out of the resources provided by the Act of 1861 for the smaller (but very large) scheme then designed.

The gradual increase year after year in the cost of material, labour, and every incident connected with the construction of works which had been going on during the whole progress of the Tyne improvements, and the prices which prevailed in 1860, would have been sufficient alone in most places to require some additional revenue to be created to meet the increased cost.

There was, however, another material cause in constant operation to decrease the surplus revenues

yearly available on which to raise the capital required for new works. This cause was the rapidly increasing proportion of steam vessels using the port as compared with sailing vessels. The proportion of tonnage of sailing vessels and steam vessels using the port in the year 1862 was as follows:—

Sailing vessels	...	...	...	88 per cent.
Steam vessels	...	...	...	12 „

These proportions went on gradually altering year after year till steam took the lead of the sail, and stood in 1875 thus:—

Steam vessels	...	...	...	60 per cent.
Sailing vessels	...	...	...	40 „

The proportion of cargo carried by a steam ship compared to her registered tonnage was much greater than that carried by a sailing vessel. Not only so, but the disproportion of cargo to the registered tonnage of steam vessels seemed likewise to be constantly increasing. It followed, therefore, that the Commissioners' revenues, derived from vessels carrying coals and other goods from the port, did not increase in the same ratio with the quantity of such goods taken away from the port as it did before the advent of steam, and as had been estimated in the calculations on which the taxation was founded.

There was another cause at work in the same direction. The revenue derived from the profit on

the conveyance of ballast brought into the port had likewise decreased, and was rapidly disappearing altogether. This was the result partly of the great increase of steam vessels which did not carry ballast, and partly from the increased cost of getting rid, or "the conveying," as it was called, of such ballast.

From these combined causes it had become evident that some additional taxation was necessary to complete the great improvements in progress.

The Commissioners would, in the session of 1875, have introduced a measure into Parliament to this effect; but, as has been seen, they had entered into an agreement with the promoters of the Bill of 1874 not to promote a taxation Bill until the new Commissioners to be elected under the Act of 1875 had been introduced into the Commission. The Bill was, therefore, delayed till the session of 1876.

In the autumn of 1875 a committee had been appointed by the Tyne Commissioners, called the Special Committee on River Revenues, to inquire, consider, and report on the subject of applying for increased Parliamentary powers. That committee, after a great many sittings and much anxious deliberation, presented a report to a special meeting of Commissioners, held on the 15th November, 1875, and, on the motion of Mr. Stevenson, M.P., seconded by Mr. R. W. Hodgson, they resolved,

by a majority of 16 to 6, to adopt the report of the committee, and to give notice of the intended application to Parliament.

It was proposed to take another step in the direction of simplification and consolidation of the different funds, and to amalgamate and consolidate the Tyne Improvement Fund, the Moorings Fund, and the Piers Fund, into one general fund, to be called the "Tyne River Fund." It was not contemplated that the amounts applicable to those three different funds should be lessened or altered in any way; but, inasmuch as the revenues for those three funds were all derived from taxation levied upon the whole commerce of the river, it was thought a simpler and cheaper plan to raise such revenues in one collection instead of three collections. The Commissioners would thus have had to administer two simple trusts, a river trust and a dock trust, and the keeping of accounts would have been much simplified and improved.

The additional taxation proposed to be raised by the Bill was to be obtained by consolidating the taxation then raised for the three funds into one schedule, as set forth in the report of the committee, and adding to such taxation to the extent that all vessels entering or leaving the port with cargo should pay dues each voyage. Hitherto, the piers dues and mooring dues had only been levied one way. The coal

due was proposed to be increased from 1d. to 1½d. per ton. The Commissioners had intended that the schedules of dues on merchandise other than coal, viz., the town and quay dues, and the river dues on goods under the Act of 1861, which two schedules varied much from each other, should be abolished, and be substituted by a moderate and uniform tariff of dues on imports and exports. Many practical difficulties stood in the way of the adoption of such a schedule, in the face of a determined opposition to the Bill, and the two existing schedules were, therefore, simply increased by percentages.

A small addition was also made to the ballast dues.

The increased dues on shipping were almost generally assented to by the shipowners of the port.

The addition to the coal due was objected to as being excessive, and an agreement was come to between the Commissioners and the North of England Coal Trade Association that only half the increase, or a farthing additional due on coal exported, should be levied in the first five years after the passing of the Act.

Great interest was taken in the measure throughout the North of England, and when Parliament met in 1876, petitions against the Bill were presented from—

1. The Corporation of Newcastle.
2. Mr. Thomas Bates.
3. Newcastle and Gateshead Chamber of Commerce.
4. General Steam Navigation Company.
5. London Steam-Ship Association.
6. Traders, coalowners, merchants, and others.

Of these, Nos. 4 and 5 were withdrawn.

Neither the Corporation nor Mr. Bates took any steps to sustain their petitions, and that of the Chamber of Commerce was struck out as having no *locus standi*, leaving only one hostile petition—that of the traders—remaining.

The petitions presented in favour of the Bill were from—

1. Corporation of Gateshead.
2. Corporation of Tynemouth.
3. Corporation of South Shields.
4. Public meeting of inhabitants at Blaydon.
5. Committee of the North of England Steamship Owners' Association.
6. Local Marine Board of Newcastle.
7. Local Marine Board of Tynemouth.
8. Local Marine Board of South Shields.
9. South Shields Chamber of Commerce.
10. North Shields Shipowners' Association.
11. Traders, coalowners, merchants, and others.

The opposing traders' petition was not influential in a shipowners' point of view, but it was so in other respects, comprising the names of many very influential firms of coalowners, merchants, manu-

facturers, and others, large contributors to the revenues of the Commissioners. The majority of dues-payers in value, however, were petitioners in favour of the Bill.

It will thus be seen how extensively the Bill, although as a Taxation Bill, naturally unpalatable, was approved of by the public opinion of the district, as well as by the actual payers of the Commissioners' dues.

The Bill came on for hearing on Tuesday, the 16th May, before a select committee, consisting of Colonel Lloyd Lindsay (Chairman), with Mr. Portman, Mr. Bennett Stanford, and Major Allen. Sir Edmund Beckett, Q.C., Mr. Pope, Q.C., Mr. Shield, and Mr. Milvain appeared as counsel for the promoters. J. and N. G. Clayton, Solicitors. Messrs. Clabon and Fearon, Parliamentary Agents.

Mr. Littler, Q.C., Mr. Bidder, Q.C., and Mr. Cottingham for the opposition. W. S. Daghish, Solicitor. Messrs. Martin and Leslie, Parliamentary Agents.

The witnesses called by the promoters were Mr. Stevenson, M.P. (Chairman of the Parliamentary Committee), the Secretary, Mr. James Guthrie, Messrs. Hugh Taylor, John Cameron Swan, William Aubone Potter, Robert Thubron, George Luckley, W. Davies Stephens, Captain Calvert—the engineer—P. J. Messent, and Sir John Coode.

Those called by the opponents were Messrs. C. Allhusen, C. M. Palmer, M.P., Hans Christian Hansen, Thomas Bates, W. H. Stephenson (Mayor of Newcastle), Addison Potter, Henry Clapham, Sir George Elliot, M.P., R. Knothe, and James Craig.

The evidence in support of the Bill was in confirmation of the statements made and the position assumed in the report of the Special Committee on River Revenues, and to the effect that the increased taxation was absolutely necessary, whilst such increase would not in any degree injure or oppress the trade of the port. The evidence given by the principal witnesses of the opposition was against the Coble Dene Dock being proceeded with. It was contended that if the dock was abandoned, as they urged it ought to be, and strict economy observed by the Commissioners in carrying on their works, additional taxation would be unnecessary to enable the river and piers works to be completed. Also, that any increase of taxation would be highly oppressive and injurious. The Bill was opposed as if it had been brought in to authorise the construction of the dock; but such construction had been authorised by the Act of 1872. No powers were asked other than the powers of 1872 for applying river funds to dock purposes, the restrictions for applying river funds to river, and dock funds to dock, purposes being repeated in the Bill. The increased

taxation proposed would undoubtedly have been pledged equally with other revenues for dock purposes as well as river purposes; but had there been no dock in question, the Bill would have been necessary.

The opponents made charges of extravagance and want of economy in the erection of the different works, whilst the Commissioners produced scientific and practical evidence as to the absolute economy with which such works had been executed.

The committee sat receiving evidence and arguments on various days, from the 16th to the 29th May, on which latter day they intimated as follows:—

The committee find that the dock accommodation of the river Tyne is sufficient to meet the present demands of the trade; and, considering the depression which is admitted to exist in the trade of the district, the committee are of opinion that this is not an opportune moment to entertain a proposal to increase the existing dues. In case of a revival of trade, there appears to be every reason to conclude that the existing dues will be sufficient to meet the purposes in view. The committee are of opinion that the portion of the preamble which relates to increase of river dues is not proved, and that the remainder of the preamble is proved.

By this decision the only important part of the preamble, viz., that which recited the necessity for an increase of dues, was struck out. The Bill was rendered worthless, and, under the advice of counsel, it was withdrawn.

The necessity for increased dock accommodation in the Tyne having been sanctioned by Parliament in 1872, under that sanction a very large sum (£140,000) had been actually expended on its construction, and all the land necessary for its completion and working been obtained.

The defeat of their Bill placed the Commissioners in a grave and awkward dilemma. Of course, all their powers under the Act of 1872 remained intact.

The Piers Fund being sufficiently ample for the purpose to which it was only applicable, viz., the extension and ultimate completion of the piers, it was at once determined that the piers works should not be in any shape or way interfered with, but pushed forward as fast as practicable.

The works on the river were, however, in a different position. In June, 1876, the Tyne Improvement Fund was not in a position to justify the Commissioners, without further revenue powers, in burdening it with the interest on the further loans of capital required to carry on the improvement. The capital expenditure on the dredging and other improvements was then going on at the rate of £120,000 or £130,000 per annum. The Commissioners were therefore compelled by their position most reluctantly for the first time to curtail the working of their dredgers, to suspend the operations which were proceeding for the deepening of the

river above bridge, to stop the works at Bill Point, and in every way to minimize the amount of expenditure which had to be met by borrowed capital.

With respect to the Coble Dene Dock, a great number of men were immediately paid off, and the progress of the works limited mostly to the completion of such portions of the quay walls, &c., as were necessary to prevent destruction to the parts then already built.

By this unfortunate state of things, not only were a vast number of workmen thrown out of employment, with great consequent suffering to themselves and families and loss to trade, but this enforced suspension of operations had to take place at a time peculiarly favourable for carrying on public works, labour and material being alike cheap and abundant. The completion of the dock and other works was delayed when it was of importance for them to be speedily finished to meet the requirements of the next great revival of trade. This state of things, happily, did not last for any time, the necessary powers being obtained, and all the work resumed the following year.

THE TYNE IMPROVEMENT BILL, 1877.

The Commissioners felt that the state of things brought about by the loss of the Bill of 1876 could not last. Everything was left in uncertainty and doubt. The future state of the Tyne was wrapt in obscurity, and nothing was clear. The river improvements being suspended at so critical and uncompleted a state of their progress, raised the most serious apprehension as to the silting up and undoing to a great extent the deepening already effected. The Commissioners did not believe that the locality really wished these valuable works to be stopped, and to give up without a struggle the fruits of so many years of labour and skill; yet they must have remained stopped or suspended till further funds were provided. Steps were taken to meet as far as practicable the objections urged the previous year, with a sincere desire to end the unhappy differences which prevailed, and secure the passing of an unopposed Bill. All steps in this direction, however, failed, and had to be abandoned.

So necessary, was it, however, for something to be done that at a Commissioners' meeting in Newcastle it was unanimously resolved to give notices of application to Parliament for increased powers.

The Parliamentary Committee, in framing the Bill, endeavoured to make it as acceptable as a taxation Bill could be made, and thus if possible obviate objections. The amalgamation of the three funds was left out, as this proposal had led to much misconception.

The increased taxation was therefore principally confined to the two funds which absolutely required it, viz., the Tyne Improvement Fund and the Moorings Fund.

The Northumberland Dock dues were also proposed to be increased, and as a further security against apprehended deficiency from the Coble Dene Dock, an addition of 25 per cent. was added to the dues to be levied in that dock.

With respect to the relative positions of the Dock and River Funds, the opponents had in 1876 tendered in evidence what was called the Newcastle clause of 1872, which made the progress of the Coble Dene Dock-works dependent on the surplus revenues derived from the working of the existing dock—that is, the working of the existing dock was to be so profitable as to bear the interest on a sufficient sum of money to complete a dock to cost twice as much as the whole cost of the present Northumberland Dock. This was unreasonable. Parliament had provided that the interest on the capital necessary to construct the new dock should, during such construction as was

usual in such cases, be charged to construction account. Some provisions must clearly be made for interest on unproductive works until such works could begin to earn revenue. If the dock was not likely to repay the cost of its own construction, it should never have been required or sanctioned as it had been by the public and by Parliament.

Whilst the Commissioners were averse, from practical experience of their injurious effects, to the insertion of prohibitory and restrictive clauses, they were very anxious to meet as far as they could all objections which had, or seemed to have, any foundation. They therefore proposed to incorporate the substance of this Newcastle clause, on condition of a moderate and defined contribution being given from the river funds to dock funds, in respect of the assistance which undoubtedly the river funds in past years had derived from the dock funds. This most reasonable and moderate proposal was fully set forth, with other features of the Bill, in the following report of the Parliamentary Committee of the 13th December, 1876:—

In laying before the Commissioners the draft of a new Tyne Improvement Bill, we must firstly refer to the Bill of last year.

The primary object of the Tyne Improvement Bill, 1876, was to increase the dues applicable to the improvement of the river, in order to complete the Parliamentary plans of works, and to enable the necessary sums for that purpose to be borrowed at the lowest rate of interest.

This Bill was opposed in Parliament principally on the ground that the increased dues proposed to be taken might, under the operation of the Tyne Improvement Act, 1872, which consolidated all the Commissioners' funds for borrowing purposes, be diverted from the purposes for which they were obtained, and be imperilled by the construction of the Coble Dene Dock, which dock was, like other works, to be formed out of capital to be borrowed on the consolidated fund.

This objection, we have felt, deserves serious consideration, and we think it desirable to obviate the objection by providing in a still more specific manner for the definite application of the Tyne Improvement Fund dues and Northumberland Dock Fund dues respectively. In doing this it will be found, however, that the river works and the dock works are very much mixed up with each other, and difficult to separate. Whilst the Tyne Improvement or River Fund has not rendered any assistance whatever to the Dock Fund, the Dock Fund has unquestionably rendered great assistance in divers ways to the River Fund, and been the means of rendering unnecessary a considerable expenditure which would otherwise have had to be made by that fund. Indeed, the formation of the Northumberland Dock was at the outset essentially a river work.

The operations of the late conservators, the Corporation of Newcastle, in their river works at Willington, had had the effect of diverting the water from and injuring the valuable shipping places at Hayhole.

In the Tyne Improvement Act, 1850, sections 63 and 64, the right of the Duke of Northumberland and his lessees to recover damages in respect thereof was preserved ; such damage, however, to be paid and borne by the Tyne Improvement Commissioners.

The cost of bringing forward the shipping staiths to the new river line alone, without the formation of any river wall to train the current, was estimated by the late Thomas John Taylor at £64,000. The whole subject was referred to the late eminent engineer, Mr.

Rendel, who proposed to preserve the shipping places, and improve the river at that place by the construction of a half-tide dock at Hayhole, estimated to cost upwards of £100,000, which would have had to be defrayed entirely by the Tyne Improvement Fund.

This unremunerative half-tide dock was by the Commissioners, under arrangements with the Duke and his lessees, superseded by a full-tide dock in which dues were to be levied to defray its cost, thus making it a remunerative commercial undertaking. This was the origin of the Northumberland Dock, rendered necessary as a river work, but the formation of which freed the river funds from a large and indefinite outlay.

In addition to this, by the extension of the dock in the construction of the present river staiths, and the removal of Sadler's Point by dredging, another river work was executed out of dock funds. Also the quay in connection with the staiths forms a wall on the river line of improvement, as does also the river wall of the Coble Dene Dock.

By the Tyne Improvement Acts, 1861 and 1865, it is provided that the Tyne Improvement Fund should contribute the sum of £50,000 towards the construction of the river wall of the then proposed Tynemouth Dock, in consideration of its acting as a river work.

It does appear, then, reasonable and a proper basis of arrangement that the Tyne Improvement Fund should for these reasons alone, without taking into account that the docks are feeders to the river funds, and that the deep water dock accommodation should be a necessary concomitant of deep water river accommodation, be liable to contribute to the Dock Fund a moderate and defined assistance or contribution ; and on such contribution being made and applied in aid of the construction of the Coble Dene Dock, the completion of that dock we propose should be made to depend on the surplus revenue of the Northumberland Dock. Thus the two funds would be placed on a strictly defined footing, and ample

security given against any undue imperilment, either of dock or river fund.

We retain the opinion that the speedy completion of the Coble Dene Dock is imperatively required in the best interests of the port. The provision of dock accommodation on the north side of the river having fallen into the hands of the Commissioners in consequence of the formation of the Northumberland Dock, under the circumstances stated, the Commissioners would not be doing justice to the position in which they are placed did they not strive to make this accommodation of the most useful and valuable kind.

We cannot see why the Tyne, with its great resources and capabilities for a vast trade, should be contented any more with the dock accommodation of nearly twenty years ago than with the unimproved river, and that, whilst other ports are increasing their dock accommodation, the Tyne should be content with things as they are. Provided that the dock can be made out of dock resources, aided as now proposed, we should hope that all opposition to its completion should cease.

The Bill which we now submit for your adoption enables the Commissioners to contribute from the River Fund to the Dock Fund either an annual sum from the revenue of the one to the other, or a capital sum in discharge at once of all claims of the dock to river assistance. The main object of the present Bill is the same as that of last year, to provide means for completion of the river works and to borrow at the lowest rate of interest.

The alterations in the taxation of the port provided by the Bill vary from the proposals of last year.

The augmented dues for the purposes of the Tyne Improvement and Moorings Funds are obtained by increasing the river tonnage due of the Act of 1861, and by charging the moorings due of one farthing on vessels each way with cargo.

Instead of increasing the existing schedules of "Town and Quay Dues" and "River Dues on Goods," these dues are both abolished

and replaced by a tariff of uniform and moderate dues on all goods imported and exported.

We submit the new schedule, subject to alterations, which may be suggested in conference with the trading interests concerned.

The increase of the due on coal proposed in the Bill carries out the arrangement made with the coal trade of March last.

The Northumberland Dock rates are increased and assimilated in all respects to the Tyne Dock rates; power is also taken to levy a differential increased rate of 25 per cent. on vessels and traffic using the Coble Dene Dock.

The existing piers dues, being deemed sufficient for piers purposes, are not proposed to be interfered with, and the piers fund is in all respects untouched by the Bill, with the exception of a power being taken to appropriate an additional capital sum of £100,000 for pier purposes.

The borrowing powers are increased from £3,700,000 to £4,000,000, to enable the Commissioners to appropriate this additional sum of £100,000 to the piers, and an additional sum of £200,000 to the Tyne Improvement Fund.

Power is taken to raise capital in the shape of debenture stock, as an alternative to the present mode of borrowing principal sums for short terms of years.

We trust that the provisions of the Bill will meet with general acceptance. The Bill is framed with a sincere desire to do impartial justice to all the great interests entrusted to the Commissioners, and to secure the completion of their authorised Parliamentary works. The river works cannot be completed without some increased taxation, the resources of the Tyne Improvement and River Moorings Funds, the two river funds, being quite inadequate for this purpose. The non-completion of the river works is attended with constant and increasing peril to the continuance of the improvements already effected, and their compulsory stoppage is the most disastrous and expensive course which can be followed.

The urgent necessity for the resumption and speedy completion of these works, both to secure greater improvements and to preserve these already effected, will, we believe, attract to the Commissioners' proposals of this year even a larger measure of support from the due payers than was extended to them last year, when an absolute majority in value of such due payers petitioned in favour of the Bill, whilst the beneficial nature of the Tyne improvements will, we are confident, command again the support of the corporations and other public representative bodies of the district.

We now submit a print of the Bill, with a recommendation that the same be deposited in Parliament as the Tyne Improvement Bill, 1877.

It is our intention to seek interviews with the coal trade, the chambers of commerce, the shipowners' societies, and other bodies interested, in order to explain and discuss the provisions of the Bill.

JAMES C. STEVENSON, Chairman.

This report was adopted and confirmed at a special meeting of the Commissioners, on the 13th of December, 1876, seventeen voting for and one against.

Interviews, accordingly, were held between the Parliamentary Committee and the various Shipping Associations, the Coal Trade, and other interests. A large public meeting of merchants also took place in the Guildhall, Newcastle, in February, 1877, at which a committee was appointed, who rendered most material assistance in promoting the Bill, and settling on a just basis the various necessary items of taxation. The Commissioners, by public advertisement, invited

suggestions and representations from all parties affected, so as to enable the Bill to be made just and equitable in its incidence on the trade of the port. When the time came for petitioning for and against the Bill, petitions of almost unprecedented number, variety, and influence, in the case of a local Bill, were presented in its favour.

All the Municipal Corporations on the banks of the Tyne (Newcastle, Gateshead, Tynemouth, South Shields, and Jarrow) were strongly in favour. Petitions in support were also presented from public meetings of merchants, manufacturers, and others, held at Newcastle, Gateshead, North Shields, South Shields, Blaydon, and Dunston; from the Local Boards of Whickham, Hebburn, Blaydon, Dunston, &c., and other representative bodies; from the North of England Steam Shipowners' Association, from the North Shields Shipowners' Association, from the Shipping and Marine Assurance Association, representing vast sums of capital embarked in shipping; from the Local Marine Boards of Newcastle, North Shields, and South Shields, and ports; and, finally, from merchants, manufacturers, traders, and others, payers of dues to the Commissioners of the most influential and representative character.

There were two petitions, one from His Grace the Duke of Northumberland, and the other from the Corporation of Tynemouth, which, though technically

against the Bill, were watching petitions, and favourable to the Commissioners' special policy.

Two opposing or hostile petitions were presented, viz. :—1. From merchants, coalowners, manufacturers, traders, and others, being to a great extent the same parties who had appeared against the Bill in 1876. 2. A petition from Captain Linskill and some others in North Shields. No appearance was made on the last-named petition.

The opposition was therefore substantially the same, and from the same parties, as in 1876; although in 1877 the dues-payers' petitions in favour were more influential and numerous than in the previous year; whilst the opposing petition, although influential, was in a dues-paying point of view a little less weighty.

The Bill came on for hearing before a Select Committee of the House of Commons, on Tuesday, the 13th March, 1877. The following gentlemen composed the Committee of the House :—Rear Admiral the Hon. Francis Egerton, M.P., Chairman, Mr. Halsey, M.P., Sir John F. F. Amory, Bart., M.P., and the Hon. Edward F. T. Digby, M.P.

Counsel for the Promoters :—Sir Edmund Beckett, Bart., Q.C., Mr. Vaughan Richards, Q.C., Mr. Pope, Q.C., and Mr. Milvain. Parliamentary Agents, Messrs. Clabon and Fearon. Solicitors, Messrs. Clayton and Gibson.

Counsel for the Duke of Northumberland :—Mr. Granville Somerset, Q.C., and Mr. Salisbury. Agents, Messrs. Bell and Steward.

Counsel for the Corporation of Tynemouth :—Mr. Venables, Q.C., and Mr. Ledgard. Agents, Messrs. Wyatt, Hoskins, and Hooper. Solicitor, H. A. Adamson, the Town Clerk.

Counsel for the opponents of the whole Bill—manufacturers, coalowners, traders, and others :—Mr. Littler, Q.C., Mr. Bidder, Q.C., the Hon. Chandos Leigh. Agents, Messrs. Martin and Leslie. Solicitor, Mr. W. S. Daglish.

The Committee sat continuously for nine days, up to the Easter recess. The inquiry was resumed after the recess, on Tuesday, the 10th April, after which the Committee sat for ten days, hearing evidence and arguments of counsel.

The following were called as witnesses on the part of the promoters, viz. :—Mr. Stevenson, M.P. (Chairman of the Parliamentary Committee), Messrs. James Guthrie (Secretary), Captain Calver, R.N., Philip John Messent (Engineer), George Baker Forster, John Bates Simpson, John F. Ure (Consulting Engineer), Henry Milvain, John Oliver Scott (Mayor of Newcastle), William Dickinson, Sir W. G. Armstrong, Thomas Bell, George Luckley, Harry Smith Edwards, Joseph Cowen, M.P., James Davidson, John Cameron Swan, John Blenkinsop, Edward F.

Lishman, Robert Thubron, Edward Jacobs, William Davies Stephens, Kennett Bayley, John Morrison, John Glover, James P. Lindsay, George Steinson, Edward Shotton, James Joicey, James A. McConnichie, C.E., and Sir John Coode, C.E.

Witnesses called by the Corporation of Tyne-mouth :—Ald. Jos. Green (Mayor), and Messrs. Henry E. P. Adamson, Henry Tully, James Bolt, Joseph Robinson, George Bell, and T. E. Smith, M.P.

By the Duke of Northumberland :—Messrs. Joseph Snowball and John Taylor.

By the opponents of the preamble *in toto* :—Messrs. Henry Clapham, John Price, Alexander Farrow, James McWilliam, Christian Allhusen, William H. Stephenson, Lindsay Wood, John S. Gill, James Hall, Thomas Richardson, John Watson, Joseph Laycock, Charles M. Palmer, M.P., Rudolph Knothe, Donald Currie, Sir George Elliot, M.P., Thomas Bates, and James Craig.

Nineteen days were occupied in this investigation. The inquiry was exhaustive, and all parties had an opportunity of giving full expression to their views. It may be added that the speech of Mr. Littler, the opposing counsel, occupied three entire days.

The principal preamble of the Bill recited as follows, viz. :—And whereas from the increased cost of construction, and other causes, the dues, rates, and

duties now constituting the Tyne Improvement Fund and the Moorings Fund have become inadequate for the purposes of those funds, and the works authorised to be executed thereby cannot be completed, and the general purposes to which those funds were and are applicable cannot be adequately discharged, and it is expedient and just that those dues, rates, and duties be altered, and to some extent increased, and that the dues, rates, and duties, payable in respect of the docks of the Commission be revised, and to some extent increased.

It was also recited, in the Bill as introduced, that by the construction of the Northumberland Dock, and the works connected therewith, a great saving to the Tyne Improvement Fund had been effected, inasmuch as the dock embankment, and quays outside the dock, acted as river works, and but for them similar works actually designed would have had to be executed out of the Tyne Improvement Fund, and that the formation of the wall and quay connected with the Coble Dene Dock would also act as river works, and for these and other reasons it was just and reasonable that the Tyne Improvement Fund should, to a limited extent, be liable to contribute to the Northumberland Dock Fund.

Section 15 of the Bill prescribed such contribution; and section 16 provided that after such contribution was made, the Commissioners should not in any one

year expend on the construction of the Coble Dene Dock a greater amount than was represented by the capitalization of the surplus income of the Northumberland Dock Fund, in the previous year, at the rate of $3\frac{1}{2}$ per cent.

The case for the promoters was substantially the same as in the previous years.

1. That a necessity for increased taxation had arisen from the following principal causes, viz. :—

The greatly increased cost of construction of works which had prevailed of late years, over the costs which were estimated when the existing river taxation was imposed.

The greatly enlarged amount of work executed.

The decreased amount of dues on shipping paid in proportion to cargo carried, owing to rapid increase of steam tonnage and displacement of sailing tonnage; and the loss of revenue from ballast.

2. That the river and dock works could not be completed without an increase of revenue.
3. That the great advantages already reaped by the port from the river improvement effected, would be imperilled by the works being left in their unfinished state, the river being liable

to silt up again, until the improvement scheme of Mr. Ure was further prosecuted.

4. That the welfare of the port required that a deep water dock should be forthwith constructed, as an adjunct to the deepened river, and as an essential requisite in fully developing the shipping and trading facilities of the Tyne.
5. That, in fact, all the works in hand, including river works, dock works, and pier works should be vigorously prosecuted to completion; and that the requisite provision should be made accordingly.
6. That the consolidation of the funds under the Act of 1872 should not be disturbed, whereby the whole were made liable for monies borrowed for their several purposes.
7. That the proposed taxation was moderate and equitable, and would not cause any diversion of trade from the port, but would, on the contrary, be the means of obtaining solid and durable advantages.

In Mr. Guthrie's evidence on the first day, viz., the 13th of March, the promoters tendered the revised Schedule of Dues on Merchandise, which had just then been carefully gone into and settled by the Committee of Merchants of Newcastle. This showed a very considerably reduced scale of rates, compared

with the rates set forth in the schedule attached to the deposited Bill. Instead of this reduction of rates being accepted, on the revised schedule being put in, the leading counsel of the opposition took exception thereto, and attempted to upset the Bill on Standing Orders. He was overruled by the Committee, and the inquiry proceeded; but the revised schedule was taken as not received, and the original schedule was considered part of the Bill until the close.

The contention of the opposition was:—

That river funds should not in any case be applied to dock purposes.

That the increased taxation was really for the purpose of the Coble Dene Dock.

That the construction of that dock was totally unnecessary, and should be at once abandoned, it being better for the Commissioners to bear the loss of the money then spent upon it than to proceed further, with an alleged certainty of a much greater loss.

That the river funds had been extravagantly and injudiciously expended.

That by economy and judicious management the existing revenues were adequate for purely river purposes.

That should it be proved otherwise, they (the opponents) were willing to submit to such

necessary increased taxation as should be shown to be absolutely requisite for river purposes alone.

That increased taxation should, if possible, be avoided, especially during the depression of trade, as tending to harass, oppress, and injure the trade of the port.

That the taxation proposed was inequitable and unjust, and ought not to be sanctioned.

It was represented on the part of the Duke of Northumberland—

That fully relying on the provisions of the Act of 1872 being faithfully carried out, and the Coble Dene Dock constructed with all reasonable despatch by means of the funds authorised by that Act, His Grace had parted without opposition with his land to the Commissioners, and instead of requiring payment for the same by a capital sum of money, had consented to accept rent-charges for the same, the payment whereof was secured by section 26 of the Act, and agreements founded thereon, and that His Grace was induced not to oppose such appropriation of his land, because he believed the dock and works would be a great public benefit, and greatly improve the value of the rest of his land in the neighbourhood.

That the provisions of the Bill would modify and injuriously control the power of the Commissioners to expend, in the manner authorised by the Act of 1872, the monies raised by the Commissioners in the construction of the dock, so that the completion thereof would be greatly deferred; to which His Grace objected, as being a breach of faith with him, and a great injury to his property and to the public; and that the security given him for his lands under the Act would be altered and injuriously affected.

That the completion of such dock was absolutely necessary to properly utilize the large expenditure already made upon the river Tyne, and would afford accommodation for, and develop, an extensive import trade.

On behalf of the Corporation of Tynemouth, it was alleged as being unfair—

That vessels loading and discharging cargoes at places near the entrance of the river, several miles below Newcastle, should have to pay the same rates as vessels using the river up to and beyond the town of Newcastle.

That larger sums were expended upon improvements connected with the upper part of the river than should be expended, in fairness to the lower parts.

That they the petitioners were directly interested in the speedy completion of the Coble Dene Dock, upon which large sums had been expended; and the completion thereof would greatly develop and improve the trade of the river.

That clause 16 was most prejudicial to the completion of the dock, and otherwise to the interests of the port.

It became evident, as the case proceeded, that clauses 15 and 16 did not meet the views of any of the petitioners who appeared, and as these had been inserted principally with a view to meet opponents' objections, and to secure unanimity, no strong defence of them was mooted by the Commissioners' counsel.

In the summing up, Sir Edmund Beckett, the Commissioners' leading counsel, intimated, on the part of the promoters, that if the Committee thought fit to confine the increase of the coal due to $1\frac{1}{4}$ d. per ton instead of $1\frac{1}{2}$ d., the Commissioners would not object.

On the 26th April the Committee gave the decision as follows, viz.:—"The Committee are of opinion that the preamble of the Bill is proved, except those portions thereof which relate to clauses 15 and 16, which should be removed from the Bill; and they are further of opinion that the coal dues referred to

in clause 6 should be $1\frac{1}{4}$ d. per ton, and that schedule B should be revised."

The Bill was accordingly altered to conform to the views of the Committee. Clauses 15 and 16 were expunged, as well as the part of the preamble relating to them; the coal due made $1\frac{1}{4}$ d. per ton; and the schedule of dues, as revised and settled by the merchants of Newcastle, was inserted in the Bill.

The result was that the promoters obtained from the Commissioners the taxation powers they had applied for, with the exception of the second or delayed farthing per ton in coal. The consolidation of the funds was preserved intact, the whole of the new taxation being applicable, with all the other revenues of the Commission, to the purposes of the Act of 1872. The borrowing powers on the Tyne Consolidated Fund were increased from £3,700,000 to £4,000,000; £200,000 of the additional £300,000 being applicable to River or Tyne Improvement Fund purposes, and £100,000 to Piers purposes.

The opposition to the Bill was continued in the House of Lords. Nearly the same parties appeared when the Bill came on for hearing before a Select Committee of that House, on Wednesday, the 20th of June. The petitions presented for and against were likewise substantially from the same parties, those in favour showing a still further increase in their weight and value in a dues-paying light.

The Duke of Northumberland and the Corporation of Tynemouth, on this occasion, petitioned and appeared against any alterations being made in the Bill as it had passed the Commons.

Mr. Donald Currie, representing the Leith and Newcastle trading steamers, had a petition, not against the preamble, but praying to be heard by counsel against certain clauses of the Bill; and Mr. Pember appeared as counsel on that petition.

The members of the Committee comprised the following Peers, viz. :—Lord Wolverton (Chairman), the Duke of Leinster, the Earl of Selkirk, Lord Cloncurry, and Lord Leigh.

The Committee sat from the 20th to the 26th of June hearing evidence and argument of counsel. The witnesses called by the promoters and opponents being very nearly the same as in the Commons.

On the 26th their lordships intimated that they were of opinion that the Bill should be proceeded with, which was equivalent to what in the Commons would have been called passing the preamble; and the clauses of the Bill were then discussed.

Mr. Littler, on the part of the opponents, tendered a clause, in substance the same as clause 16, which had been rejected by the Commons, viz., “That the Commissioners should not expend more, in any one year, on the construction of the Northumberland Dock than an amount represented by the

capitalized value of the surplus income of the Northumberland Dock in the preceding year."

Their lordships intimated that they would not entertain that clause, or any clause of that stringent nature.

Mr. Littler also proposed a clause providing that no part of the proceeds of the additional taxation granted by the Bill on the River Fund should be applied to dock purposes in the manner prescribed by the Act of 1872. This clause was rejected by the Committee.

Mr. Bidder, for the opponents, next tendered the following clause for acceptance in lieu of the clauses in the Bill granting the increased taxation (which latter-named clauses, with their schedules, would have had to be struck out), viz., "The Commissioners may from time to time increase, by an amount not exceeding in the whole 25 per centum, the dues, rates, and duties which they are authorised to demand, receive, and recover, under section 54 of the Tyne Improvement Act, 1861; section 58 of the Tyne Improvement Act, 1861, as modified by section 7 of the Tyne Improvement Act, 1865; section 3 of the Tyne Coal Dues Act, 1872; section 33 of the Tyne Improvement Act, 1852; and the town and quay dues as defined by the Tyne Improvement Act, 1850."

On this clause the Secretary, Mr. Guthrie, was examined and cross-examined by counsel.

The Chairman intimated that after the evidence just heard, the clause would not be entertained.

Mr. Bidder next tendered a clause to the effect that the same rates or dues should be levied on all vessels entering or leaving the Tyne to or from any port north of the Elbe, or as far north as Bergen, but excluding all ports in the Baltic south of Copenhagen and Malmo, as were levied in respect of vessels to or from ports situated between the river Elbe and Brest.

Mr. James Craig and Mr. Stevenson, M.P., were called on this clause, and gave further evidence. Sir Edmund Beckett addressed the Committee against the clause, and Mr. Bidder was heard in reply, when the Chairman intimated that their lordships would not accept the clause.

After Mr. Pember had addressed the Committee on behalf of Mr. Donald Currie, the preamble, clauses, and schedules of the Bill were read and agreed to.

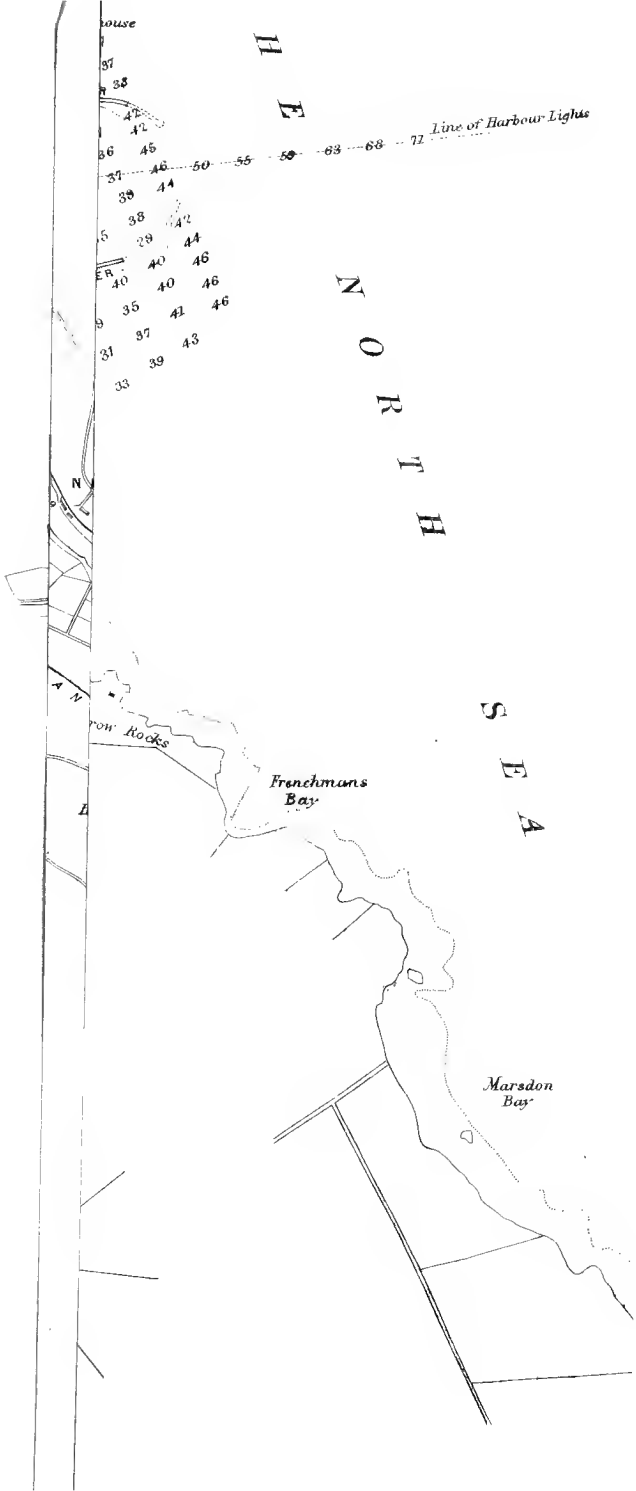
The Royal Assent was given on the 12th day of July, 1877, and the Bill passed into a law.

After the passing of the Act the River Improvement works and the Coble Dene Dock works were vigorously resumed, the principal works remaining to be completed being—

1. The further deepening of the river above bridge, the removal of Whitehill Point, the

finishing of Bill Point works, and the execution of such other improvements as necessity might require and funds permit.

2. The completion of the Tyne Piers. The North Pier has now about attained the point at which a temporary termination will be made, and the South Pier will also be prosecuted to a similar point. After such temporary terminations have been reached, both piers will be slowly advanced to their final terminations at a rate of progress to be governed by the experience gained in finally deciding the most important question of the permanent width of the river entrance between the pier-heads.
3. The completion of the Coble Dene Dock. This work is being prosecuted in a most energetic manner. The excavations, with the powerful aid of one of the dredgers and three steam navvies, are making rapid progress. The masonry works are also following closely upon the excavations. Then the erection of the gates will follow; and it may be anticipated that this important addition to the trading facilities of the Tyne will soon be in working order and ready for traffic.



COSTS OF THE TYNE IMPROVEMENTS.

TYNE IMPROVEMENT FUND.

The total expenditure on this fund, from the 9th of November, 1850, to the 31st of December, 1879, which includes every item of outlay, whether of revenue or capital, amounted to £3,456,165 15s. 6d. There had been during the same period revenue received from various sources, amounting to £1,679,121 1s. 6d., leaving a balance of capital expenditure of £1,777,044 14s. 0d.

The principal items of expenditure for works were as follows:—

Dredging plant, consisting of dredgers, hopper barges, steamtugs, &c., with Howdon Yard workshops and Ma- chinery	£280,293 1 11
Dredging—working expenses thereof and maintenance of plant, &c.	£1,126,315 17 7
Bill Point, removal of	88,810 7 8
Newcastle Bridge, removal and recon- struction of	296,069 14 0
River works, consisting of training walls and other operations in various parts, and contributions towards river moor- ings	187,087 12 9

There had also been paid sums amounting to £62,815 17s. 1d., being cost of Shields ferry undertaking, and sums amounting to £31,225 12s. 5d. for various properties at Shields and Howdon, but which are treated as assets representing the sums.

RIVER MOORINGS FUND.

Of this fund there had been expended from June 17th, 1852, to the end of 1877, for the provision and laying down in Shields harbour and the river of moorings for vessels, a capital expenditure of £40,457 4s. 9d.

TYNE PIERS FUND.

From June 17th, 1852, to the end of 1879, the total expenditure for works, interest, and all outlay was	£1,138,547	9	11
Pier dues received during the same period	542,424	9	6
	<hr/>		
Capital expenditure	£596,123	0	5

Up to that date the actual works have cost altogether—

North Pier works	£412,086	18	10
South Pier works	337,145	13	10
Trow Rock purchase	6,000	0	0
Engineering and Salaries	28,143	16	11

The remaining expenditure consisting principally of cost of collecting dues and interest on loans.

NORTHUMBERLAND DOCK FUND.

From 1853 to the end of 1879 the total outlay on this fund, including both revenue and capital expenditure, was	£1,546,496	0	7
Revenue received from October, 1857...	668,855	11	7
	<hr/>		
Balance of capital expenditure...	£877,640	9	0

The cost of the works up to the 31st December, 1879, was as follows:—

Northumberland Dock, construction of, and internal extensions	£354,077	11	2
Dock extension, consisting of quays, wharfage, railways, and shipping places outside of dock	198,035	17	4
Coble Dene Dock, construction of ...	418,096	8	10
	<hr/>		
Total ...	£970,809	17	4

SUMMARY OF CAPITAL EXPENDITURE UP TO THE 31ST OF DECEMBER, 1879.

Tyne Improvement Fund	£1,777,044	14	0
River Moorings Fund	40,457	4	9
Tyne Piers Fund	596,123	0	5
Northumberland Dock Fund	877,640	9	0
	<hr/>		
Total ...	£3,291,265	8	2

The amount of mortgage debt at the same date charged on the funds of the Commissioners was £3,366,109 7s. 5d. The borrowing powers of the Commissioners extend to £4,000,000 sterling.

THE TYNE AS ONE OF THE GREAT PORTS OF THE EMPIRE.

The Tyne, as one of the great ports of the empire, now presents facilities for trade of the most abundant kind. The deep river, cleared practically from the obstruction of a bar entrance, extends from the sea up to, and for miles above, the town of Newcastle, and is in the course of being further extended inland. The Swing Bridge opens for navigation and shipping purposes what is really a new river. The noble deep-water quay of Newcastle stretches for close upon a mile in front of the town, and may receive any required extension upwards or downwards. Besides other facilities, there are on this quay three cranes capable of lifting heavy weights of 20 tons, 60 tons, and 80 tons respectively. In addition to other existing warehouse accommodation, the Newcastle Grain Warehouse Company have extensive warehouses for grain and flour, fitted up with all modern appliances for rapid discharge and safe storage. The whole quay is laid with rails connected with a branch line to the North-Eastern Railway. The Corporation of Gateshead and the Railway Company have also quays at Gateshead similarly connected with the railway system. With the land arches made on the erection of the Swing Bridge, the quay in both

sections of Newcastle and Gateshead can be continuously joined to any extensions above bridge. The whole distance from Newcastle and Gateshead on the north and south banks to the ports of Shields is occupied by manufactories, quays, wharves, docks, shipbuilding yards, and other industrial establishments, having now the advantage of the riverside branches of the North-Eastern Railway. The graving docks and slipways on the Tyne are of an especially valuable character, notably those of A. Leslie and Co., C. Mitchell and Co., Palmers' Shipbuilding and Iron Company, and of Edwards, Young, and the Middle Dock Company at Shields.

The deep-water dock accommodation of the Tyne comprises :—(1.) The North-Eastern Railway Company's Tyne Dock, with a dock space of 50 acres, and with large warehouse and other accommodation for the receipt, storage, and transmission of goods to all parts. (2.) The Northumberland Dock, with a dock space of about 50 acres. In connection with this dock are deep-water quays, railways, wharves, and shipping places outside, and most extensive storage provision for merchandise, in full connection with the railway system. Those two great docks have on their cills a depth of—Tyne Dock, 10 feet at low water ordinary spring tides, making 24 feet at high water; Northumberland Dock, 9 feet at low water, and 23 feet at high water ordinary spring tides.

The Coble Dene Dock now in course of construction will have a water space of 23 acres. It will have on its cills, at low water of spring tides, a depth of 15 feet. It will also have a lock entrance founded in a depth of 22 feet at low water, so that vessels can be locked in and out at all times of the tide. The dock is designed to meet the requirements of the deepened river, and to give accommodation afloat to the very largest and most valuable class of vessels. In connection with it, and with the Northumberland Dock, a large space of ground (about 300 acres) has been obtained, to be devoted to purposes of railway communication, warehouses, transit sheds, and other accompaniments of a great dock system.

The quays of the Corporation of Tynemouth and South Shields are also in process of development. The fish trade at the Low Lights Quay is important and extending.

Geographically, the Tyne is well situated. Connected with the railway system of the country, rich in natural and manufactured products, and traversing a district so populous, extended, and enterprising, it is sufficient of its own resources always to command a great local trade. Enhanced, however, in its capabilities by the river improvement, dock accommodation, and extended facilities of all kinds, the development of which has been recounted in these pages, the Tyne is calculated to meet, and will no

doubt attract to its waters, an ever-increasing proportion of the import and export trade of all parts of the world. A few miles of railway carriage in these days is not so vital a matter as the obtaining of safe and sufficient accommodation, rapid despatch, and good freights. Within moderate and proportionate limits, where facilities are provided, trade comes and settles. This is abundantly shown by the history of other ports; and we may confidently anticipate that the port of the Tyne will not be an exception, but will rapidly take rank, in addition to its position as the greatest coal port, as one of the chief importing and exporting harbours of the empire for general merchandise.

It is a subject of common remark how little is known at a distance of the important and extended trade done in the Tyne. When men of the Tyne compare it with the Thames, the Mersey, the Clyde, Hull, and other large shipping centres, incredulity is not uncommonly expressed, and the Tyne looked upon as comparatively insignificant. The real facts, however, only require to be considered to dispel such conceptions. The following figures, taken from an unexceptionable official source, viz., the returns of the Trade and Navigation of the United Kingdom for 1879, presented to Parliament by command of Her Majesty, show the number of vessels, and the tonnage thereof, which cleared outwards during that year, with cargoes, from some of the principal ports, viz.:—

			VESSELS.		TONNAGE.
Liverpool	...	...	12,427	...	5,884,457
Tyne Ports	...	...	15,722	...	5,413,723
London	...	...	15,905	...	4,650,707
Cardiff	...	...	12,112	...	3,409,220
Sunderland	...	...	9,254	...	2,279,560
Glasgow	...	...	6,745	...	2,035,256
Hull	...	...	3,553	...	1,280,930
Leith	...	...	2,416	...	628,585
Bristol	...	...	4,326	...	571,666

The aggregate clearances for the whole of the United Kingdom, in the same year, were—

			VESSELS.		TONNAGE.
England and Wales	...	...	159,865	...	34,882,024
Scotland	...	...	36,537	...	6,633,020
Ireland	...	...	17,260	...	4,441,652
Total			...	...	45,956,696

The Tyne ports thus show about one-sixth of the clearances, with cargoes outwards, from all England and Wales. They exceed four-fifths of those from Scotland; are more than the whole of the clearances from Ireland; and are upwards of one-ninth of the total from the United Kingdom of Great Britain and Ireland.

In respect of clearances inward, or of customs duties paid, or of what is called the declared value of goods exported, the Tyne does not, of course, hold the same relative high position, coal, the

staple, being not a valuable, but a very bulky article, yet requiring the same amount of shipping to carry it as more valuable goods.

Besides, the enormous export trade here shown demonstrates the certainty of outward freight to vessels coming to the Tyne with import cargoes. The great desideratum in the development of the port is to cultivate an import trade, so that vessels may bring in merchandise, which are to be laden with coal and manufactured goods outwards. At present more than one-half the vessels arriving in the Tyne are in ballast; but the proportion is happily decreasing.

The customs duties paid are no criterion of the trade of a port, for these duties fluctuate, and are fortunately only levied on certain articles of commerce. Were such duties taken as a test, the port of London would appear to do half the trade of the United Kingdom.

The customs duties collected during 1878, the latest period for which the returns have been received, were as follows:—

Port of London	...	...	...	...	£10,095,988
Liverpool	...	...	...	...	3,096,258
Other English ports	...	...	...	...	2,782,266
Scotland	...	...	...	...	1,588,208
Ireland	...	...	...	...	1,792,914
Total					£19,355,634

In respect of the registered tonnage of vessels belonging to the port the Tyne stands fourth, the following table shows the amount belonging to the undermentioned principal ports, viz. :—

			VESSELS.		TONNAGE.
Liverpool	...	...	2,494	...	1,541,810
London	...	...	2,764	...	1,133,909
Glasgow	...	...	1,183	...	760,913
Tyne Ports	...	...	1,087	...	382,719
Sunderland	...	...	521	...	204,100
Hull	...	...	852	...	185,931
Leith	...	...	183	...	73,569
Cardiff	...	...	215	...	80,352
Bristol	...	...	277	...	63,755

As, however, a very considerable number of steam vessels of great size, belonging to Tyne owners, are for various reasons registered as belonging to the port of London, the above statement shows less than the actual tonnage of the northern river. The whole registered tonnage of the United Kingdom, as taken from the same Parliamentary Return, was as under, viz. :—

	SAILING SHIPS.		STEAM SHIPS.		TOTALS.	
	Vessels.	Tonnage.	Vessels.	Tonnage.	Vessels.	Tonnage.
England & Wales	16,048	2,956,930	3,739	1,907,709	19,787	4,864,639
Scotland	2,467	881,951	1,035	543,601	3,502	1,425,552
Ireland	1,430	174,306	240	56,792	1,670	231,098
United Kingdom...	19,945	4,013,187	5,014	2,508,102	24,959	6,521,289

With respect to shipbuilding the Tyne stood first for number and aggregate tonnage of steam vessels built in 1879, but putting both steam and sailing vessels together the port ranked second, as per following return, viz. :—

	SAILING SHIPS.		STEAM SHIPS.		TOTALS.	
	Ships.	Tons.	Ships.	Tons.	Ships.	Tons.
Glasgow	14	10,831	92	83,038	106	93,869
Tyne Ports	2	1,030	114	86,255	116	87,285
Sunderland	4	3,715	55	54,671	59	58,386
Hartlepool ... ..	...	.....	22	20,578	22	20,578
Port Glasgow	7	7,821	24	8,512	31	16,333
Stockton	2	175	15	15,336	17	15,511
Liverpool	10	2,971	10	11,538	20	14,509
Greenock	6	454	14	12,465	20	12,919
Belfast	4	3,875	8	7,557	12	11,432
Whitby	1	42	7	7,403	8	7,445
London	35	1,556	60	4,575	95	6,131

The total shipbuilding of the United Kingdom in the same year was—

		NUMBER.		TONS.
Sailing ships ... ..	...	405	...	61,617
Steam ships ... ..	...	510	...	344,412
		<hr/>		
Total		915	...	406,029

In the shipment of coal the Tyne stands first, as appears by the following statement taken from

“Browne’s Export List” for 1879, showing the quantities from all places shipping above 100,000 tons, viz. :—

	COASTWISE.	FOREIGN.	TOTALS.
	Tons.	Tons.	Tons.
Tyne Ports	2,890,702	4,533,363	7,424,065
Cardiff	827,458	4,271,206	5,098,664
Sunderland	2,099,959	1,029,495	3,129,454
Newport	983,696	943,425	1,927,121
Swansea	549,064	681,399	1,230,463
Hartlepool	607,578	541,910	1,149,488
Liverpool	478,268	557,041	1,035,309
Seaham	558,809	35,374	594,183
Hull	51,430	412,940	464,370
Troon	291,448	104,189	395,637
Ayr	354,570	7,944	362,514
Goole	87,008	255,640	342,648
Grimsby	38,399	257,016	295,415
Ardrossan	221,567	66,043	287,610
Glasgow ... ..	.....	247,466	247,466
Blyth	43,597	190,554	234,151
Whitehaven	217,545	309	217,854
Charlestown	11,376	184,534	195,910
Llanelly	116,383	71,127	187,510
Granton	65,982	120,544	186,526
Alloa	15,392	159,699	175,091
Amble	91,369	76,504	167,873
Greenock ... ..	.....	119,360	119,360
Grangemonth ... ..	.....	119,310	119,310
Irvine	102,189	4,787	106,976
The Tees	48,179	58,377	106,556

NOTES.

The following particulars, as to important changes that have taken place as the result of the extensive works of improvement that have been executed, will be interesting:—

TIDAL WATER.

Before 1860 high water at Newcastle Bridge occurred 60 minutes later than at the entrance to Shields Harbour, a distance of about $9\frac{1}{2}$ miles, whilst at Newburn, about $7\frac{1}{2}$ miles above Newcastle, it was 29 minutes later than at the latter town.

In 1879, since the improvements, high water at Newcastle occurs only 12 minutes later than at the entrance to Shields Harbour; and the difference of time between high water at Newcastle and Newburn has been reduced to 8 minutes.

Another advantageous effect of the improvements is that the quantity of tidal water that entered the river at spring tides in 1860 has been increased by 14,000,000 cubic yards, which will be further increased when the whole plan of improvement is completed by 5,000,000 cubic yards.

In addition to these improvements, the navigable channel of the river at low water spring tides, between the Narrows and Newcastle Bridge, has, since 1860, been increased by 65 acres, Sandbanks of that area having been removed, and deep water made in their place.

THE BAR.

In 1860 the depth of water on the Bar was 6 feet 6 inches at low water, or 21 feet 6 inches at high water spring tides.

In 1879 the depth of water at the entrance to the Tyne was not less than 22 feet at low water, or 37 feet at high water spring tides.

DEPTH OF WATER IN THE RIVER AT THE DOCK ENTRANCES.

Tyne Dock Entrance.—In 1860 the depth of water outside the Tyne Dock Entrance was 12 feet at low water, or 26 feet at high water spring tides, and in 1879 the depth of water was 14 feet at low water, or 29 feet at high water spring tides.

Northumberland Dock Entrance.—The depth of water outside the Northumberland Dock Entrance has been increased from 10 feet at low water, or 24 feet at high water spring tides, in 1860, to 17 feet at low water, or 32 feet at high water spring tides, in 1879.

NEWCASTLE HARBOUR.

In 1860 the depth of water in the sailing channel, from the Ouseburn to the Tyne Bridge, varied from $3\frac{1}{2}$ feet to $8\frac{1}{2}$ feet at low water, or from 16 feet to 21 feet at high water spring tides.

In 1879 the depth of water in the sailing channel, from the Ouseburn to the Newcastle Bridge, varied from 20 feet to 25 feet at low water, or from 35 feet to 40 feet at high water spring tides.

NEWCASTLE QUAY.

In 1860 the greatest depth at low water in the berthage alongside the quay wall was 6 feet 6 inches, whilst in some places the foreshore at the base of quay was 3 feet above low water, making a varying depth of from 9 feet 6 inches to 19 feet at high water spring tides.

In 1879 the depth of water in the berthage alongside the quay wall varied from 10 feet to 20 feet at low water, or from 25 to 35 feet at high water spring tides.

RIVER TYNE ABOVE BRIDGE.

The river above Newcastle Bridge, in 1879, has been deepened up as far as the Elswick Ordnance Works on the north side, and as far as the Dunston Forge on the south side of the river, the depths varying from 13 feet to 20 feet at low water, or from 28 feet to 35 feet at high water spring tides.

In 1860, in the same portion of the river, the depth varied from 2 feet to 7 feet at low water, or from 12 feet to 17 feet at high water spring tides.

In 1860 the low water surface, between Elswick and the Tyne Bridge, had an inclination or slope of about 2 feet per mile towards the sea, whereas in 1879 the low water surface was practically level as far as the deep dredging had been executed.

Above Elswick and Dunston the river has been widened at Lemington, Blaydon, and Stella, and a new cut has been formed through Blaydon Haugh, the width of the river being about 400 feet at high water spring tides.

The river above Stella Coal Staiths to Newburn and Ryton will be widened and deepened according to the plans of improvement in progress.

The above works, except where otherwise stated, were constructed from the designs of Mr. J. F. Ure, who actively superintended them until October, 1870, when he partly, and in February, 1873, when he wholly retired from the active superintendence, and remains Consulting Engineer.

The whole of the works now in progress for the Tyne Commissioners are under the charge of Mr. P. J. Messent, as Acting Engineer, who superintended the Piers Works from their commencement first as Resident, and afterwards as Acting Engineer.

AREA OF THE RIVER TYNE AT HIGH WATER SPRING TIDES

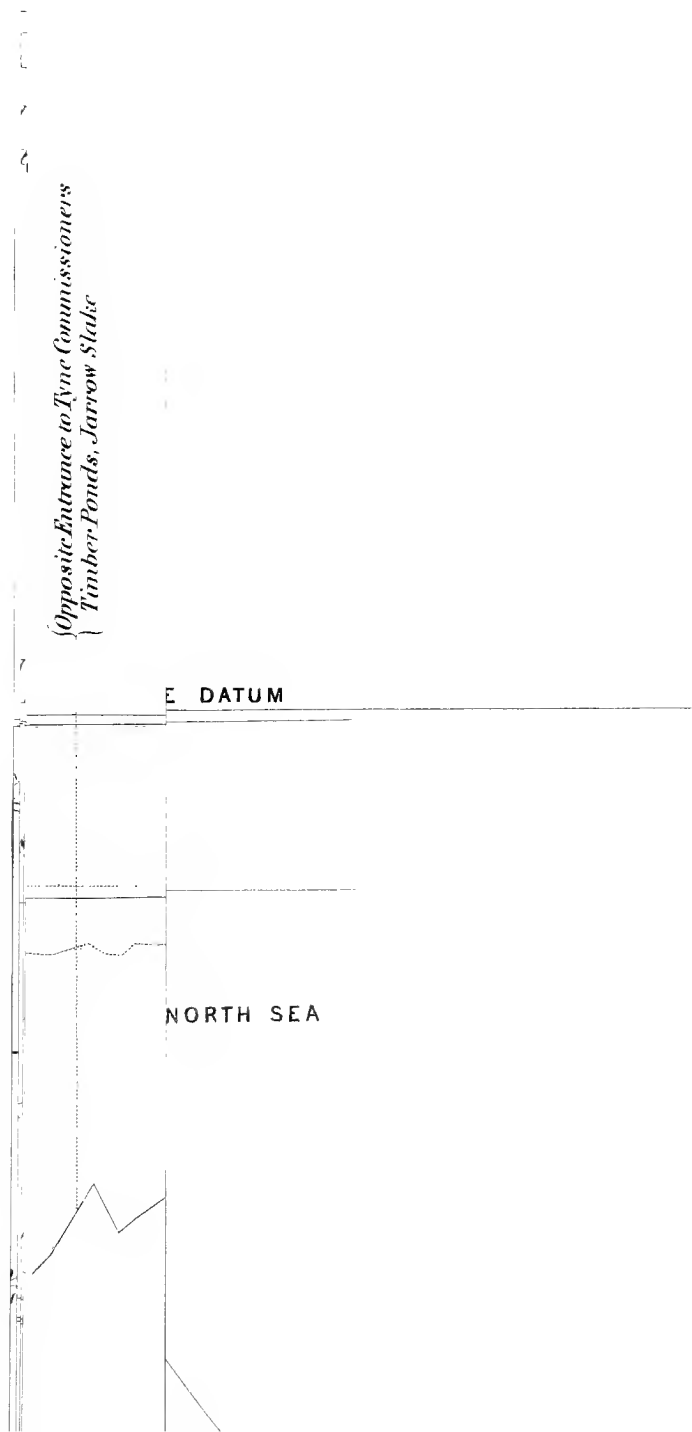
IN ACRES.

	ACRES.
When the Tyne Piers are completed to the full extent contemplated—viz., in 30 feet at low water spring tides—the area comprehended between the Pier Heads and the Narrows will be about	450
The area at present being about	<u>390</u>
	ACRES. ACRES.
Shields Harbour, from the Narrows to the Northumberland Dock Entrance, contains	281
From the Northumberland Dock Entrance to Low Walker Brickworks the channel of river contains	318
From Low Walker Brickworks to Friars Goose Point the channel of river contains	206
Newcastle Harbour, from Friars Goose Point to Newcastle Swing Bridge, contains	<u>93</u>
From the Narrows to Newcastle Swing Bridge	898
From Newcastle Swing Bridge to the limit of the deep-water area of river at Elswick and Dunston the channel of river contains	<u>166</u>
The total now available deep-water area of the channel of river for trading purposes, from the Narrows to Elswick and Dunston, is	1,064
Which by the contemplated deepening will be further increased by	<u>419</u>
Total area of channel of river from the Narrows to the Boundary Stone, near Ryton, is	<u>1,483</u>
Carried forward	1,483

*Opposite Entrance to Tyne Commissioners
Timber Ponds, Jarrow Slake*

E DATUM

NORTH SEA



	ACRES.	ACRES.
Brought forward		1,483
In addition to the foregoing areas, Jarrow Slake, partly used as timber ponds, contains	205	
Other recessed portions of river on the north and south banks of river not comprehended in the channel	29	
	—	234
The area of Docks is as follows, viz.:—		
Northumberland Dock, basin and lock	58½	
Tyne Dock, basin and lock	52½	
Coble Dene Dock (in progress) when completed, with basin, will contain	27	
	—	138
<hr/>		
Total area of channel from the Narrows to the Boundary Stone, near Ryton, including Jarrow Slake and other recessed portions and the Docks		<u>1,855</u>

GENERAL SUMMARY.

	ACRES.
The Entrance to the Tyne from the Pier Heads to the Narrows	390
Deep-water channel available for trading purposes from the Narrows to Elswick and Dunston	1,064
Channel of river from Elswick and Dunston to the Boundary Stone, near Ryton	419
Jarrow Slake and other recessed portions on banks of river	234
Area of Docks	138
<hr/>	
Total area of river from the Tyne Pier Heads to the Boundary Stone, near Ryton, including Docks ...	<u>2,245</u>

THE REDHEUGH BRIDGE.

The following short description of the Redheugh Bridge is condensed from an interesting account of the structure and its origin, by Richard Cail, Esq., one of the Directors of the Company:—

To supply the seriously felt want of a high level communication between the western portions of the boroughs of Newcastle and Gateshead, the Redheugh Bridge Company was formed and obtained parliamentary powers in 1867, having the support of the Gas and Water Companies, who, on condition of the main pipes being supported across the river on the new viaduct, agree to take shares to the extent of £10,000, being a portion of the amounts which they received by agreement from the Tyne Commissioners as compensation for removing their pipes from the Old Tyne Bridge, which was about to be replaced by the New Swing Bridge.

The Redheugh Bridge was commenced in 1868, and, after some delays in consequence of the Engineer to the Tyne Commissioners having required the foundations of the river piers to be commenced at a much greater depth below the water than at first contemplated, and from some other causes, was completed and open for traffic in June, 1871.

The total length of the bridge and viaducts, between the high land on either side of the river, is 1,453 feet, and is made up of four river spans, with several land arches on the north side of the river and four on the south side.

The opening of each of the two central river spans is 236 feet and of the two side spans 157 feet. The openings of each of the land arches are, on the north side 25 feet, and on the south side 25 feet. The height of the under side of the bridge is 87 feet above high water line, or about 4 feet higher than the High Level Bridge. The river spans are formed of two longitudinal wrought-iron lattice girders, each 838 feet long and $22\frac{1}{2}$ feet high, supported on

three river piers, the foundations for each of which consist of four cast-iron cylinders, sunk by the pneumatic process to about 60 feet below high water, filled with concrete, upon which masonry is raised to 7 feet above high water. Above this level each of the piers is formed of four cast-iron columns, 3 feet diameter, braced together at frequent intervals by horizontal frames and diagonal braces. These piers are raised, tapering upwards to about 64 feet above the underside of the longitudinal girders, and from their tops support four diagonal tension bars, to add to the strength of the longitudinal girders, which, however, were estimated to be of sufficient strength without such aid.

The carriageway, between the longitudinal girders, is 20 feet wide, and the footways outside them each 7 feet wide, all supported by cross girders secured to the bottoms of the longitudinal girders. The footways are protected by light wooden parapets of trellis-work.

Provision is also made for carrying a main water pipe 2 feet diameter and a gas main of 2 feet 4 inches diameter.

The land arches are of masonry, and the road and footways are protected by neat brick parapets.

Chief engineer, Sir Thomas Bouch; resident engineer, Mr. Thomas Gibson; contractor for the masonry, Mr. Walter Scott; contractors for the ironwork, Messrs. Pantou, of Sunderland, and Joseph Tillotson.

The whole cost of the bridge was £35,000.

THE SWING BRIDGE.

The weight of the swing or opening part is 1,450 tons, its total length 281 feet, and the bridge is calculated to bear safely a load of 60 tons moving on four wheels. (See page 145.)

IMPORT ACCOMMODATION AT NORTHUMBERLAND DOCK.

A timber deep water quay was constructed by the Tyne Commissioners inside the Northumberland Dock, in 1872, for import traffic, and a stone quay, about 1,100 feet long, having a depth of about 18 feet at low water, was completed under the Act of 1867 outside and eastward of the Northumberland Dock entrance, in connection with the railways authorised under that (1867) Act.

SALMON STATISTICS.

The following statistics are from the Inspectors' Report of Salmon Fisheries (England and Wales) for the year 1878, the latest return issued:—

The High Level Bridge at Newcastle-upon-Tyne crosses one of the most, if not the most, important of English salmon rivers, namely, the Tyne. This river is important not only on account of the commercial industries—coal, iron, and chemicals—carried on along its bank, but it is also of the highest interest to salmon culturists, as we learn from it how judicious treatment may improve the produce of a large salmon farm.

In 1870, 36,450 salmon were taken in the district; in 1871, 120,600; in 1872, 129,100; in 1873, 86,792; in 1874, 21,746; in 1875, 23,290; in 1876, 24,840; in 1877, 41,300; in 1878, 48,150.

This extraordinary increase accompanied with the condition of the fisheries in 1860, may be accounted for by the fact that the spawning grounds of the Tyne are of a very first-class character, and that the fish have now free access to them. The causes of the falling off in the capture in the years 1874–5–6 have been fully discussed by Mr. Walpole, in our 16th Annual Report, p. 41.

THE TYNE IMPROVEMENT COMMISSIONERS,
1879-80.

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MR. WM. RUTHERFORD HUNTER. | MR. ADDISON POTTER.
„ JAS. COCHRAN STEVENSON, M.P. | „ EDWARD SHOTTON.

ELECTED BY CORPORATIONS.

NEWCASTLE.

MR. THOMAS RIDLEY, Chairman. | MR. RICHARD CAIL.
„ BENJAMIN PLUMMER. | „ WM. HASWELL STEPHENSON.
„ HENRY MILVAIN. | „ JOHN OLIVER SCOTT.

GATESHEAD.

MR. RICHD. WELLINGTON HODGSON. | MR. ROBERT STIRLING NEWALL.

TYNEMOUTH.

MR. JOHN RICHARDSON PROCTER. | MR. GEORGE BELL.
MR. JOSEPH GREEN.

SOUTH SHIELDS.

MR. JOHN BRODRICK DALE. | MR. HARRY SMITH EDWARDS.
MR. HENRY NELSON.

ELECTED BY PAYERS OF TYNE DUES.

SHIPOWNERS.

MR. JOHN MORRISON. | MR. MATTHEW CAY.

COALOWNERS.

MR. JOHN JOICEY, M.P. | MR. WILLIAM AUBONE POTTER.

TRADERS.

MR. WILLIAM WATSON PATTINSON. | MR. HENRY CLAPHAM.

AUDITORS.

MR. RICHARD HENRY HOLMES . . . Newcastle Council.
„ RICHARD ANDERSON WOOD . . . Gateshead Council.
„ HENRY EDGILL SMYTH . . . South Shields Council.
„ THOMAS THOMPSON CLARKE . . . Tynemouth Council.
„ WILLIAM DAVIES STEPHENS . . . Dues Payers.

OFFICERS.

Secretary—ROBERT URWIN. | *Assistant Secretary*—J. G. ARMSTRONG.

Engineer—PHILIP J. MESSENT, M. Inst. C.E.

Harbour Master—ED. H. LISHMAN.

Harbour Master at Newcastle—JAMES COOPER.

Northumberland Dock Master—THOMAS GLOVER.

Superintendent of River Police—JOHN STEPHENS.

Collectors of Dues on Shipping—THE COLLECTORS OF CUSTOMS AT
NEWCASTLE AND NORTH AND SOUTH SHIELDS.

Collector of Dues on Goods—THOMAS D. HUME.

RIVER TYNE IMPROVEMENT.

INVENTORY OF DREDGING PLANT, 1879.

DREDGING POWER.

- No. 1, Single Dredging Machine, with timber hull, 20 H.P., commenced work in 1843, will dredge to a finished depth of 17 feet.
- No. 2, Double Dredging Machine, with iron hull, 50 H.P., commenced work in 1855, will dredge to a finished depth of 26 feet.
- No. 3, Double Dredging Machine, with timber hull, 25 H.P., commenced work in 1861, will dredge to a finished depth of 28 feet.
- No. 4, Double Dredging Machine, with iron hull, 50 H.P., commenced work in 1861, will dredge to a finished depth of 30 feet.
- No. 5, Double Dredging Machine, with iron hull, 55 H.P., commenced work in 1863, will dredge to a finished depth of 35 feet.
- No. 6, Double Dredging Machine, with iron hull, 55 H.P., commenced work in 1863, will dredge to a finished depth of 34 feet.

TOWING POWER.

No. 2, Steam Tug, "Cowen"	25 H.P.,	commenced work in 1859.
No. 3, Do. "Usher"	32 H.P.,	do. 1860.
No. 4, Do. "Northern Light" ...	38 H.P.,	do. 1861.
No. 5, Do "Moselle"	38 H.P.,	do. 1861.
No. 6, Do. "Commissioner" ...	45 H.P.,	do. 1862.
No. 7, Do. "Progress"	38 H.P.,	do. 1863.

CARRYING POWER.

	Timber Built.	Iron Built.	Total.
Side Hoppers, for transporting Dredgings...	4	0	4
Bottom Hoppers, do.	36	0	36
Screw Steam Hoppers, do. (22 H.P. each)	0	10	10
Barges	7	1	8
Keels	3	0	3
Punts	2	0	2
	<u>52</u>	<u>11</u>	<u>63</u>

RIVER TYNE IMPROVEMENT.

STATEMENT OF THE QUANTITIES OF DREDGING PERFORMED IN THE RIVER TYNE AND NORTHUMBERLAND DOCK SINCE THE COMMENCEMENT OF DREDGING.

Years.	Old* Dredger.	No. 1† Tyne Dredger.	No. 2‡ Newcastle Dredger.	Fanny§ Dredger.	No. 3¶ Dredger.	No. 4** Dredger.	No. 5†† Dredger.	No. 6‡‡ Dredger.	TOTAL.
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
1838	21,579	...	...	...	...	...	...	...	21,579
1839	40,205	...	...	...	...	...	...	...	40,205
1840	16,260	...	...	...	...	...	...	...	16,260
1841	14,515	...	...	...	...	...	...	...	14,515
1842	21,948	...	...	...	...	...	...	...	21,948
1843	2,296	13,020	...	...	...	...	...	...	15,316
1844	...	25,199	...	...	...	...	...	...	25,199
1845	...	63,237	...	...	...	...	...	...	63,237
1846	...	33,333	...	...	...	...	...	...	33,333
1847	...	58,396	...	...	...	...	...	...	58,396
1848	...	41,993	...	...	...	...	...	...	41,993
1849	...	74,993	...	...	...	...	...	...	74,993
1850	...	66,452	...	...	...	...	...	...	66,452
1851	...	79,221	...	...	...	...	...	...	79,221
1852	...	91,532	...	...	...	...	...	...	91,532
1853	...	97,529	...	...	...	...	...	...	97,529
1854	...	56,376	...	...	...	...	...	...	56,376
1855	...	67,264	30,623	...	...	...	...	...	97,887
1856	...	57,181	97,028	...	...	...	...	...	154,209
1857	1,720||	72,590	130,137	39,219	...	...	...	...	243,666
1858	...	54,396	171,868	89,153	...	...	...	...	315,417
1859	...	90,372	207,249	198,781	...	...	...	...	496,402
1860	...	124,471	282,376	266,988	...	...	...	...	673,835
1861	...	122,411	236,348	25,178	138,406	224,589	...	...	746,932
1862	...	173,795	256,581	...	582,061	852,107	...	...	1,864,544
1863	...	167,964	204,964	...	590,416	911,090	425,076	174,343	2,473,853
1864	...	131,929	272,187	...	650,697	882,827	945,324	1,297,071	4,180,035
1865	...	111,520	366,273	...	631,333	1,005,430	1,271,623	1,159,635	4,545,814
1866	...	169,643	496,108	...	780,067	16,15,464	1,200,662	1,461,641	5,273,585
1867	...	97,531	359,670	...	637,566	704,940	1,123,930	1,198,021	4,121,658
1868	...	195,740	369,524	...	681,436	725,837	1,007,216	1,231,973	4,211,726
1869	...	192,500	545,833	...	880,772	816,761	991,220	1,085,091	4,512,177
1870	...	110,263	251,361	...	878,597	982,119	635,023	1,186,706	4,044,069
1871	...	158,946	295,378	...	772,389	933,762	916,006	904,063	3,980,544
1872	...	185,757	290,942	...	616,405	1,006,807	880,410	892,224	3,872,545
1873	...	201,435	257,714	...	454,417	295,819	886,062	594,395	2,689,842
1874	...	239,531	215,948	...	321,278	363,925	770,394	479,826	2,390,902
1875	...	271,417	230,818	...	320,139	703,651	25,339	662,298	2,213,662
1876	...	142,632	202,795	...	185,985	634,897	...	385,789	1,552,098
1877	...	92,489	257,654	...	159,994	821,155	...	307,167	1,638,459
1878	...	342,016	212,885	...	324,578	600,484	...	777,333	2,257,296
1879	...	137,488	315,310	...	397,376	...	...	758,003	1,608,177
Total	118,523	4,412,562	6,557,574	619,319	10,003,912	13,631,664	11,078,285	14,555,579	30,977,418

* Commenced work May 14, 1838, and ended February 22, 1843.
† Commenced work June 26, 1843, and was laid up from July 15, 1876, to August 10, 1877.
‡ Commenced work July 10, 1855, and was laid up from April 26 to August 30, 1876.
§ Commenced work April 23, 1857, and ended February 14, 1861.
|| A bired dredger.
¶ Commenced work July 12, 1861, and was laid up from July 15, 1876, to August 2, 1877.
** Commenced work July 17, 1861, and was laid up December 28, 1878.
†† Commenced work July 27, 1863, and was laid up January, 14, 1875.
‡‡ Commenced work October 5, 1863, and was laid up from July 15, 1876, to August 4, 1877.

A STATEMENT SHOWING THE POPULATIONS OF NEWCASTLE,
GATESHEAD, NORTH SHIELDS, SOUTH SHIELDS, AND JARROW
DURING THE PRESENT CENTURY.

	1801.	1811.	1821.	1831.	1841.	1851.	1861.	1871.
Newcastle	33,048	32,573	41,794	53,613	70,337	87,784	109,108	128,443
Gateshead, including } Heworth Felling }	11,484	11,687	15,688	20,601	26,513	33,674	43,064	61,563
North Shields, in- } cluding Tynemouth }	13,171	17,558	23,173	23,206	25,481	29,188	34,021	38,941
South Shields	11,011	15,165	16,503	19,756	23,072	28,974	35,239	45,336
Jarrow	1,566	3,193	3,530	3,598	3,600	3,835	6,494	24,361

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