

# *JAMES BRINDLEY.*

*Millwright and Civil Engineer.*

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A biographical note prepared for the occasion  
of the unveiling of a plaque to mark the site  
of the cottage in which he was born at Tunstead  
in the parish of Wormhill, Derbyshire.

Published by the  
Local History Section  
of the  
Derbyshire Archaeological Society.  
November 1st, 1958

"The Father of British Canals"



Painted by J. Parsons.

Engraved by H. Cook.

JAMES BRINDLEY.

JAMES BRINDLEY

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Millwright and Civil Engineer

Pioneer Builder of the Great Canals of England

Born 1716, Died 27th September 1772

A Biographical Note Prepared for the Occasion of the

Unveiling of a plaque to mark the site of the

Cottage in which he was born, at Tunstead

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County of Derbyshire

Published by the Local History Section  
of the Derbyshire Archaeological Society,  
1st November 1958.

PREFACE

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James Brindley was born in a small cottage standing on a croft in the hamlet of Tunstead, which is four miles north-east of Buxton, and forms part of the parish of Wormhill.

For well over a century the place of his birth was marked only by a large ash tree, which had taken root amongst the flagstones of the floor of the ruined cottage. The tree having blown down a few years ago, it was suggested by the Local History Section of the Derbyshire Archaeological Society that a more permanent memorial should be erected. This proposal was approved by the Parish Council of Wormhill, and actively encouraged by Miss Y.H.B.Hartford, who is a member of the Fleming family, which has owned the property in which Brindley's Croft is situated, since shortly after Brindley's death.

On November 1st 1958, a bronze tablet, bearing the following inscription, will be erected :-

JAMES BRINDLEY

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1716 - 1772

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MILLWRIGHT AND CIVIL ENGINEER

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Here stood the cottage in which James Brindley was born.

Of humble birth, he became famous as the pioneer builder of the great canals of England.

This plaque was erected by the Local History Section of the Derbyshire Archaeological Society and unveiled by J.L.Longland, Esq., M.A., on November 1, 1958, when Miss Y.H.B.Hartford planted the adjacent ash tree.

The note which follows has been prepared for those who might be interested in learning a little more about this remarkable man.

His most comprehensive biography is that by Samuel Smiles, who devoted a considerable portion of Volume I. of his "Lives of the Engineers", first published in 1861, to a Life of James Brindley. Most of what has been written since has been taken from this work.

It has therefore been thought preferable to reproduce here extracts from writings prior to those of Smiles. These include a short Life of Brindley, which was published in 1795, just over 20 years after his death, and this is given in full. In addition there are numerous quotations from the still earlier writings of his contemporaries. These are perhaps not so well known, and deserve a wider circulation.

Those who wish to learn more about Brindley and his canals will find a short bibliography at the end of the extract. This is followed by a short note on the village of Wormhill, which Brindley must have known well during his childhood and youth.

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### JAMES BRINDLEY

The full measure of the achievements of James Brindley can perhaps only be appreciated by civil engineers and by those students of canal history who are familiar with his works.

In these days of universal education and overcrowded technical colleges and universities, it is a little difficult to visualise the handicaps under which the pioneer engineers of the eighteenth century were compelled to labour. Text books were rare, as indeed were the accomplishments of reading and writing. Science was the preoccupation of the few, and it was strictly a gentlemanly pursuit, while Applied Science was non-existent as a subject for study. With all this, communications were slow and difficult so that it was not easy to gain knowledge of what the few other workers in similar fields were doing. This is well illustrated by Smiles' story of how Brindley, while still an apprentice, walked 50 miles to Manchester and back, between stopping work on Saturday night and starting again on Monday morning, in order to inspect the machinery of a paper mill. Unable to make notes, he memorised all the details, and the concern with which his action was regarded at the time is ample evidence of how unusual it was.

At the time of his great work on the Bridgewater Canal, which was begun in 1759, the Industrial Revolution can hardly be said to have started. Although men were already interested in machinery, and had been for some time past, James Watt had still to invent his improvements to Newcomen's atmospheric steam engine, while the spinning machines of Arkwright and Hargreaves were still ten years away. It is against this background that we see the full blaze of Brindley's genius.

It was this first Venture into canal-building which seized the imagination of the public, as nothing had before. The young Duke of Bridgewater wished to obtain cheap transport for sending coal from his collieries at Worsley, to Manchester, and he conceived the idea of a canal. This meant crossing the River Irwell, and the original plans involved the building of a series of locks to lower the canal from the level of the coal mines, down to the river. The Duke enlisted Brindley who quickly put forward the suggestion that the canal should be carried across the river by means of an aqueduct 200 yards long.

The proposal was received with ridicule, so much so that Brindley asked the Duke to seek another opinion. The person consulted, who is thought to have been the civil engineer, John Smeaton, referred to the aqueduct as a "castle in the air". Nevertheless, the Duke went ahead with the project, which was entirely successful, so that it is not surprising that the consultant preferred that his opinion should be forgotten.

This started the canal boom, and Brindley's fame was assured.

People flocked to view the wonder. Arthur Young wrote in 1768 "The effect of coming at once on to Barton Bridge, and looking down upon a large river, with barges of great burden towing along it, and up another river, hung in the air, with barges sailing upon it, form altogether a scenery somewhat like enchantment. The number of foreigners who have visited the Duke of Bridgewater's present navigation is surprising."

Brindley was in great demand after this, in many parts of the country. Other engineers entered the field, and many contrary opinions were expressed upon the feasibility of the routes which were planned. It therefore became customary for the promoters of canals to seek the advice of the competitors of their original consultant. Thus we find Smeaton, in 1761, reporting that the route selected by Brindley for the canal from Wilden Ferry on the Trent to King's Bromley was "well chosen....Mr.Brindley having judiciously designed the course....."

But later, competition apparently having intensified, and possibly with his chagrin at his mistake over the Barton Aqueduct not entirely forgotten, we find Smeaton, in 1768, highly critical of the proposals put forward by Brindley, Yeoman and Golborne for the Forth-Clyde Canal. Smeaton's review is couched in mild and formal language on the whole, as he was on friendly terms with the other engineers, but a note of querulity creeps in, and here is the only astrigent comment on Brindley which has so far come to light:-

"As no difficulty is too great for Mr.Brindley, I should be glad to see how he would stow a fire-engine cylinder cast at Carron, of  $6\frac{1}{2}$  feet diameter, in one of his seven feet boats, so as to prevent it breaking the back of the boat, or oversetting, " and again in the same Review, "...but pray, Mr.Brindley, is there no way to do a thing right but the way you do? I wish you had been a little more explicit on the many accounts; I think you only mention one, and that is to give more time to examine the two ends; but pray, Mr.Brindley, if you were in a hurry, and the weather happened to be bad, so that you could not satisfy yourself concerning them, are the works to be immediately stopped when you blow the whistle, till you can come again, and make a more mature examination? "

Before this, however, Brindley had begun another great project, the Grand Trunk Canal, to link the Mersey with the Severn and the Trent. Its whole length was  $139\frac{1}{2}$  miles, its rise from the Mersey to its summit 395 feet, and several tunnels were necessary, including the famous Harecastle Tunnel, 2880 yards long, through a variety of difficult rocks and quicksands. Although Brindley's

progress with this canal silenced those who had condemned the tunnel scheme as impractical, it was not in fact finished until after his death.

Unlike many others, who have had to wait for posterity for their ability to be recognised, the aptitude of Brindley for tackling the unusual was appreciated by those who had engaged his services as a millwright. Nevertheless, his great modesty prevented him from insisting upon the rewards which were his due. Even when the Duke of Bridgewater engaged him and embarked with him upon the series of adventures which established the foundations of the canal system of England, he took the most modest of salaries, about 3/6d per day. Smiles reproduces interesting extracts from his accounts, showing how extremely frugal he was with his employer's money. This habit of frugality, doubtless formed during an impecunious youth, persisted and enabled him to save money and to invest in the booming canal companies, so that he had become moderately wealthy by the time of his death at the age of 56.

Two things stand out in the history of his achievements. That he was a genius cannot be doubted, but it is remarkable how everyone who had known him or had known of him acknowledged this, and also testified to the generosity of his nature. A contemporary said of him "Mr. Brindley is one of those great geniuses whom Nature sometimes rears by her own force, and brings to maturity without the necessity of cultivation".

William Bray, writing in his "Sketch of a Tour into Derbyshire and Yorkshire", in 1776, says, "It was the duke's great happiness to meet with a man of Mr. Brindley's genius, which broke out like the sun from a dark cloud, he having been totally destitute of education", and of the Bridgewater canal he writes, "These undertakings are truly stupendous, and strongly mark the spirit of enterprise which is so much the character of the present age".

Again, in 1777, John Golborne, the Civil Engineer who had improved the navigation of the Clyde in 1770, refers to "That great Genius, Mr. Brindley".

With all this, it is important to realise that he could hardly read or write, and that most of his plans were formed by sheer mental application. It was his habit, when faced with an apparently insuperable practical problem, to retire to bed to think out the solution, which on occasion took him one or two or even three days.

Smiles gives many interesting extracts from Brindley's notebooks, to which he had had access when writing the "Life". One such is the following record of the voting of the Parliamentary Committee which considered the Duke of Bridgewater's Bill for a canal from Manchester to the Mersey, in 1762 :-

" ad a grate Division of 127 fort Duk

98 nos

for t<sup>e</sup> Duk 29 MeJorete"

How many people can recognise that 29 majority at the first reading ?

The other facet of his character on which we find universal agreement is that although he was rough and uncultured, Brindley was a thoroughly nice man, with a big and generous nature. Bray said, "Nor did Mr. Brindley, with a littleness too common, endeavour to conceal his discoveries in mechanics; he has readily made them public, and has reared men whose abilities are now distinguished. " And Aikin said of him, " He was far above envy and jealousy, and freely communicated his improvements to persons capable of receiving and executing them; taking a liberal satisfaction in forming a new generation of engineers able to proceed with the great plans in the success of which he was so deeply interested. "

His death at the early age of 56 is ascribed by Smiles to causes which apply with equal force today :-

".....we doubt whether mere hard work ever killed any man, or whether Brindley's labours, extraordinary though they were, would have shortened his life, but for the far more trying condition of the engineer's vocation -- irregular living, exposure in all weathers, long fasting, and then, perhaps, heavy feeding when the nervous system was exhausted, together with habitual disregard of the ordinary conditions of physical health. These are the main causes of the shortness of life of most of our eminent engineers, rather than the amount and duration of their labours".

And so, getting soaked through while out on a mission, and being put into a damp bed at an inn, he became seriously ill. Diabetes developed, and he died at his house at Turnhurst, Staffordshire, on the 27th of September 1772. He was buried at New Chapel, at Turnhurst, on September 30th, 1772, having in the last 13 years of his life engineered some 365 miles of canals.

There follows the extract from Aikin's book. As a succinct account of the life and achievements of such a busy man it could hardly be bettered.

ACCOUNT OF MR. BRINDLEY

from "A Description of the Country from Thirty

to Forty Miles Round Manchester"

by J. Aikin, M.D., 1795 - Pages 139-145

James Brindley was born at Tunsted in the parish of Wormhill, Derbyshire, in 1716. His father was a small freeholder, who dissipated his property in company and field-amusements, and neglected his family. In consequence, young Brindley was left destitute of even the common rudiments of education, and till the age of seventeen was casually employed in rustic labours. At that period he bound himself apprentice to one Bennet, a mill-wright, at Macclesfield, in Cheshire, where his mechanical genius presently developed itself. The master being frequently absent, the apprentice was often left for weeks together to finish pieces of work concerning which he had received no instruction; and Bennet on his return was often greatly astonished to see improvements in various parts of mechanism of which he had no previous conception. It was not long before the millers discovered Brindley's merits, and preferred him in the execution of their orders to the master or any other workman. At the expiration of his servitude, Bennet being grown into years, he took the management of the business upon himself; and by his skill and industry contributed to support his old master and his family in a comfortable manner.

In process of time, Brindley set up as a mill-wright on his own account, and by a number of new and ingenious contrivances greatly improved that branch of mechanics, and acquired a high reputation in the neighbourhood. His fame extending to a wider circle, he was employed in 1752 to erect a water-engine at Clifton, in Lancashire, for the purpose of draining some coal-mines. Here he gave an essay of his abilities in a kind of work for which he was afterwards so much distinguished, driving a tunnel under ground through a rock nearly 600 yards in length, by which water was brought out of the Irwell for the purpose of turning a wheel fixed thirty feet below the surface of the earth. In 1755 he was employed to execute the larger wheels for a silk mill at Congleton; and another person, who was engaged to make other parts of the machinery, and to superintend the whole, proving incapable of completing the work, the business was entirely committed to Brindley; who not only executed the original plan in a masterly manner, but made the addition of many curious and valuable improvements, as well in the construction of the engine itself, as in the method of making the wheels and pinions belonging to it. About this time, too, the mills for grinding flints in the Staffordshire potteries received various useful improvements from his ingenuity.

In the year 1756 he undertook to erect a steam-engine upon a new plan at Newcastle-under-Line; and he was for a time very intent upon a variety of contrivances for improving this useful piece of mechanism. But from these designs he was, happily for the public, called away to take the lead in what the event has proved to be a national concern of capital importance - the projecting the system of canal navigation. - The duke of Bridgewater, who had formed his design of carrying a canal from his coal-works at Worsley to Manchester, was induced by the reputation of Mr. Brindley to consult him on the execution of it; and having the sagacity to perceive, and strength of mind to confide in, the original and commanding abilities of this self-taught genius, he committed to him the management of the arduous undertaking. The nature and progress of this enterprise have already been described; it is enough here to mention, that Mr. Brindley, from the very first, adopted those leading principles in the projecting of these works, which he ever afterwards adhered to, and in which he has been imitated by all succeeding artists. To preserve as much as possible the level of his canals, and to avoid the mixture and interference of all natural streams, were objects at which he constantly aimed. To accomplish these, no labour and expense was spared; and his genius seemed to delight in overcoming all obstacles to them by the discovery of new and extraordinary contrivances.

The most experienced engineers upon former systems were amazed and confounded at his projects of aqueduct bridges over navigable rivers, mounds across deep valleys, and subterraneous tunnels; nor could they believe in the practicability of some of these schemes till they saw them effected. In the execution, the ideas he followed were all his own; and the minutest, as well as the greatest, of the expedients he employed, bore the stamp of originality. Every man of genius is an enthusiast. Mr. Brindley was an enthusiast in favour of the superiority of canal navigations above those of rivers; and this triumph of art over nature led him to view with a sort of contempt the winding stream, in which the lover of rural beauty so much delights. This sentiment he is said to have expressed in a striking manner at an examination before a committee of the House of Commons, when on being asked, after he had made some contemptuous remarks relative to rivers, what he conceived they were created for: - he answered, "To feed navigable canals." - A direct rivalry with the navigation of the Irwell and Mersey, was the bold enterprize of his first great canal; and since the success of that design, it has become common all over the kingdom to see canals accompanying with insulting parallel the course of navigable rivers.

After the successful execution of the duke of Bridgewater's canal to the Mersey, Mr. Brindley was employed in the revived design of carrying a canal from that river to the Trent, through the counties of Chester and Stafford. This undertaking commenced in

the year 1766; and from the great ideas it opened to the mind of its conductor, of a scheme of inland navigation which should connect all the internal parts of England with each other, and with the principal sea-ports, by means of branches from this main stem, he gave it the emphatical name of the Grand Trunk. In executing this, he was called upon to employ all the resources of his invention, on account of the inequality and various nature of the ground to be cut through: in particular, the hill of Harecastle, which was only to be passed by a tunnel of great length, bored through strata of different consistency, and some of them mere quicksand, proved to be a most difficult as well as expensive obstacle, which, however, he completely surmounted. While this was carrying on, a branch from the Grand Trunk to join the Severn near Bewdley was committed to his management, and was finished in 1772. He also executed a canal from Droitwich to the Severn; and he planned the Coventry canal, and for some time superintended its execution, but on account of some difference in opinion, he resigned that office. The Chesterfield canal was the last undertaking of the kind which he conducted, but he only lived to finish some miles of it. There was, however, scarcely any design of canal-navigation set on foot in the kingdom during the latter years of his life in which he was not consulted, and the plan of which he did not either entirely form, or revise and improve. All these it is needless to enumerate; but as an instance of the vastness of his ideas, it may be mentioned, that on planning a canal from Liverpool to join that of the duke of Bridgewater at Runcorn, it was part of his intention to carry it by an aqueduct bridge across the Mersey, at Runcorn-gap, a place where a tide sometimes rising fourteen feet rushes with great rapidity through a sudden contraction of the channel. As a mechanic and engineer he was likewise consulted on other occasions; as with respect to the draining of the low lands in different parts of Lincolnshire and the Isle of Ely, and to the cleansing of the docks of Liverpool from mud. He pointed out a method which has been successfully practised, of building sea-walls without mortar; and he was the author of a very ingenious improvement of the machine for drawing water out of mines by the contrivance of a losing and a gaining bucket.

The intensity of application which all his various and complicated employments required, probably shortened his days; as the number of his undertakings, in some degree, impaired his usefulness. He fell into a kind of chronic fever, which, after continuing some years with little intermission, at length wore out his frame, and put a period to his life on September 27th, 1772, in the 56th year of his age. He died at Turnhurst, in Staffordshire, and was buried at New Chapel in the same county.

In appearance and manners, as well as in acquirements, Mr. Brindley was a mere peasant. Unlettered and rude of speech, it was easier for him to devise means for executing a design, than to communicate his ideas concerning it to others. Formed by nature for the profession he assumed, it was there alone that he was in his proper element; and so occupied was his mind with his business, that he was incapable of relaxing in any of the common amusements of life. As he had not the ideas of other men to assist him, whenever a point of difficulty in contrivance occurred, it was his custom to retire to his bed, where in perfect solitude he would lie for one, two, or three days, pondering the matter in his mind, till the requisite expedient had presented itself. This is that true inspiration, which poets have almost exclusively arrogated to themselves, but which men of original genius in every walk are actuated by, when from the operation of the mind acting upon itself, without the intrusion of foreign notions, they create and invent. A remarkably retentive memory was one of the essential qualities which Mr. Brindley brought to his mental operations. This enabled him to execute all the parts of the most complex machine in due order, without any help of models or drawings, provided he had once accurately settled the whole plan in his mind. In his calculations of the powers of machines, he followed a plan peculiar to himself; but, indeed, the only one he could follow without instruction in the rules of art. He would work the question some time in his head, and then set down the result in figures. Then taking it up in this stage, he would again proceed by a mental operation to another result; and thus he would go on by stages till the whole was finished, only making use of figures to mark the several results of his operations. But though, by the wonderful powers of native genius, he was thus enabled to get over his want of artificial method to a certain degree, yet there is no doubt, that when his concerns became extremely complicated, with accounts of various kinds to keep, and calculations of all sorts to form, he could not avoid that perplexity and embarrassment which a readiness in the processes carried on by pen and paper can alone obviate. His estimates of expense have generally proved wide of reality; and he seems to have been better qualified to be the contriver, than the manager, of a great design. His moral qualities were, however, highly respectable. He was far above envy and jealousy, and freely communicated his improvements to persons capable of receiving and executing them; taking a liberal satisfaction in forming a new generation of engineers able to proceed with the great plans in the success of which he was so deeply interested. His integrity and regard to the advantage of his employers were unimpeachable. In fine, the name of Brindley will ever keep a place among that small number of mankind, who form eras in the art or science to which they devote themselves, by a large and durable extension of their limits.

FURTHER READING

- (1) Foremost among Brindley's biographers is Samuel Smiles.  
See his "Lives of the Engineers", Vol I 1861.
- (2) "British Canals" by Charles Hadfield - Phoenix House 1950.
- (3) "The Canals of England" by Eric de Mare - The Architectural Press - 1950.
- (4) "The Inland Waterways of England" by L.T.C.Rolt -  
George Allen and Unwin - 1950.
- (5) "James Brindley" by Laurence Meynell - Werner Laurie - 1956.
- (6) "Six Months Tour Through the North of England" by  
Arthur Young - 1770-1.
- (7) Reports of the late John Smeaton, F.R.S. 1812.

A NOTE ON WORMHILL

The quiet little village of Wormhill lies in a fold of the hills in the ancient Royal Forest of the Peak, over a thousand feet above sea level. The old stage-coach road from Sheffield to Buxton skirts the high ground above the village, and below the River Wye winds through lovely Cheedale and Miller's Dale.

There is evidence of occupation in prehistoric times in the round barrows on Bolchill and at Wind Low where, about a hundred years ago, a stone cist was excavated containing human remains, pieces of urn and flint, and a very beautiful necklace. A stone axe-head and flint implements of neolithic times, a bronze spear-head of later date and a Roman gold coin have been found in the neighbourhood - the Roman road to Buxton from Brough passes through the parish. More recently Mr. F. Mosley turned up the blade of a Bronze Age double-edged sword while ploughing.

Wormhill was one of the manors given to Henry de Ferrers, a Norman Knight, by William the Conqueror, and was then in the Parish of Hope. The great Forest of the Peak - extending to about forty square miles - was a Royal hunting ground and the wild deer and boar were strictly preserved. Until the end of the 15th century wolves were prevalent and Camden, the great Elizabethan historian, tells us in speaking of the High Peak - ".....this part tho' it is rough and craggy in some places, yet are there grassy hills and vales in it, which feed many cattel and great flocks of sheep very safely. For there's no danger of wolves now in these places, tho' infested by them heretofore; for the hunting and taking of which some hold lands here at Wormhill, from whence they were called Wolvehunt, as is clearly manifest from the records of the Tower". The manor later was held by Sir Thomas Foljambe, Bailiff of the Forest, and ultimately came into the possession of the Bagshawes whose name appears in the earliest records of the Forest as 'foresters of fee', holding their lands under covenant to protect the King's 'verte and veryson'.

The Old Hall at Wormhill, where the Bagshawe family lived, one of the oldest inhabited houses in Derbyshire, was originally surrounded by a high wall for the protection of stock, part of which is still standing and in it there is a loop-hole through which the wolves were shot with bows and arrows. The present lovely Hall was built by Adam Bagshawe in the 17th century.

In 1273 the inhabitants of Wormhill were given leave by the Dean of Lichfield to erect a Chapel and "to find at their own expense a chaplain". Of that early Chapel, dedicated to Saint Margaret, nothing now remains except the base of the tower and the present building dates from 1864. Part of the shaft and the base of an old Cross stand to the south of the Church, and what

may have been the base of an earlier Cross can be seen in a field on the high ground to the north-east of the Church. From this vantage point, looking towards Tideswell across Monksdale, one can see the site of the Grange of the monks of Lenton Priory, who gathered tithes of lambs and wool from the district.

On what was formerly the village green there is still fixed in an immense stone the bull-ring, to which the unfortunate beast was tethered for bull-baiting; and nearby the stone posts of the stocks now serve as gateposts. Facing the Green is a wellhead erected in 1875 to the memory of James Brindley.

A. L. H.