

WHO WAS 'IRON-MAD WILKINSON?'

John Wilkinson (1728 - 1808) was the leading Ironmaster, entrepreneur and inventor of his day. He expanded the use of steam power and significantly contributed to the Great in Great Britain.



- "King of the Ironmasters" said Thomas Telford
- The first true industrialist
- Drove forward the early Industrial Revolution
- Inspired the world's first iron bridge and boat
- Father of the machine tool industry that made the modern world, enabled steam engine development and accelerated the industrial revolution
- First steam powered blast furnace that overcame the lack of water power for water wheels.
- Acclaimed for his advanced farming methods
- Father of South Staffordshire Iron Industry / Black Country and opened up the trade to Birmingham by initiating the BCN canal that overcame the lack of good roads. eg cost of coal in Bham nearly halved



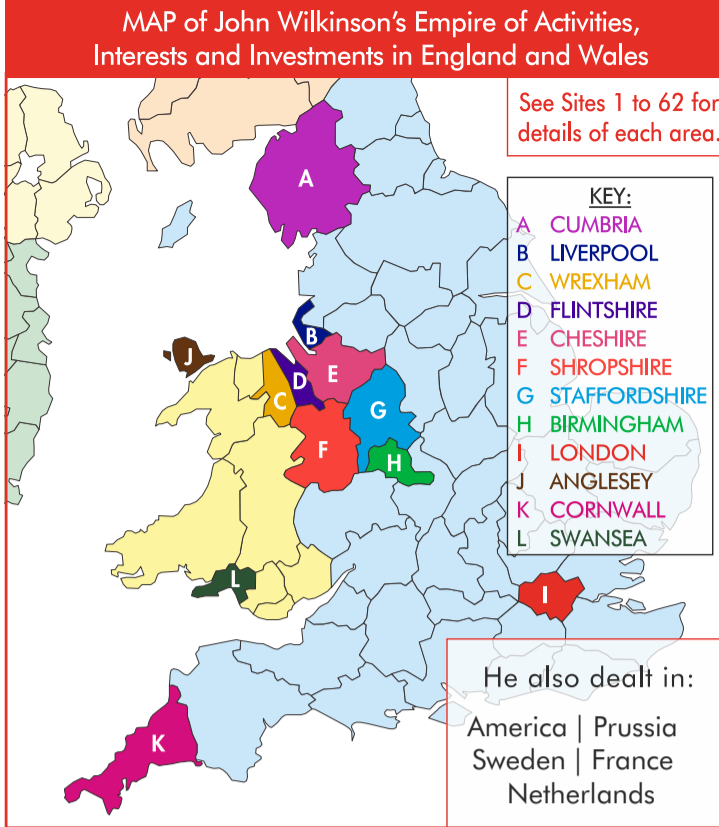
Cannon for Nelson's ship victory. Ref.8



The world's first iron bridge. Ironbridge, Shropshire. Courtesy of IGMT



Trade token coinage. See item 16



INTERNATIONAL BUSINESS

John Wilkinson had sales and investments in America, Sweden, Prussia, Netherlands and France. He had his own ships as well as barges.

Notably Wilkinson was an investor in the Paris water system and in 1777 supplied 40 miles of pipes and Boulton & Watt engines to Paris Water Works built by the Perrier Brothers, who held a great banquet in the city hall for Wilkinson in 1781. The pipes were escorted by the French men of war ships

In 1775 his brother William was persuaded by the French to leave the UK foundry at Bersham to set up factories in France. see Bersham Ironworks site 10 opposite and Wrexham.gov.uk/museums

This wide spread of interests and activities is remarkable considering how expensive, slow and difficult travelling, transportation and communications were in the eighteenth century. That is by horse or canal etc, which makes his achievements, leadership, judgment of character and management skills even more remarkable, **A three times genius, of 1. leadership, 2. industry and 3. invention, probably the greatest entrepreneur of his time.**

WAS WILKINSON DOWN YOUR WAY? Sites of John Wilkinson's Uk Activities, Investments and Businesses

- ## A CUMBRIA
1. Little Clifton, John's Birthplace. Born in a cart between his home and Workington market in 1728.
 2. Backbarrow blast furnace, in 1736 John's father Isaac, who was a shepherd, became a pot founder and then chief pot founder in 1740 aged 40. This site is now a museum.
 3. Bare Syke, Backbarrow was the home of John's father Isaac in 1735. Isaac cast his own iron pots from the Backbarrow blast furnace and in 1738 he patented a flat iron for ironing clothes.
 4. Wilson House, Lindale was the home of John's father, Isaac, in 1744. By then John had two brothers and two sisters. Isaac had his own furnace at the family home.
 5. Kendal - John attended a Unitarian Academy run by the Rev. Dr Caleb Rotherham. This was a school and a theological academy. John learnt mathematics, science and modern languages for the engineering future his father planned.
 6. HOME - John's retirement home at Castlehead where he reclaimed 500 acres from the sea. Today it is the Castlehead Field Study Centre. See picture.
 7. Lindale is the site of John's 40ft high 20 ton iron monument bearing his portrait and his epitaph. Initially he was buried at Castlehead in 1808 then again in a vault under St. Paul's Church, Lindale in an iron coffin close to his wife's memorial plaque in 1828. The monument was originally at Castlehead then later moved to Lindale in 1863. See pictures.
- ## B LIVERPOOL
8. Ironmonger apprenticeship from 1745 to 1750 with M. Nicholson
 9. Wilkinson used the port for moving cannon by sea to London and to exchange his token coins for coin of the realm.
- ## C WREXHAM
10. Bersham Ironworks, Wrexham was taken over by John's father Isaac in 1753, then later was run by John and his brother William. In the 1750's Isaac was using coke and charcoal for iron smelting. John made cutting edge technology engine cylinders, cannon & boilers at Bersham Ironworks. Some of the works remains at West Bersham and East Bersham Museum. See pictures.
 11. HOME - Brymbo Hall, purchased in 1792, but was demolished in 1973 for mining purposes. A great architectural loss to Wales.
 12. HOME - The Court, Fecham, became the home of John's younger brother, William Wilkinson from 1774.
 13. Brymbo Ironworks, established 1796. The Brymbo Estate included 872 acres and many mines. John also farmed it and converted 150 acres of wild heath to agriculture. GKN then United Engineering Steels made carbon and electrically melted steels here until 1991.
 14. BANK - Brymbo Ironworks Bank.
 15. Minera and Llyn y Pandy, Soughton, lead and zinc mines, also lime kilns. Minera was reconstructed by Wrexham Council.
 16. Ruabon - Lead mines and lime kilns.
 17. Cae-Ilo lead smelting house, where some remains are still visible.

The author at the 40ft high, 20 ton cast iron John Wilkinson column in Lindale, Cumbria See site 7 above

No1 Furnace at Brymbo, which ran from 1796 to 1894. (See site 13 above.) Drawn by Ron Davies, Ref 6. Also there are two 20th century versions of Wilkinsons cupola furnace.

Also at Brymbo is an SSSI fossilised forest and the Brymbo Heritage Walks. The Brymbo Heritage Group are intending to develop the heritage area.

The Lawns, Broseley was his home and HQ for 30 years. See site 27

Castlehead, Morecambe Bay, nr Grange over Sands, his retirement home. See site 6

West Bersham Ironworks, Wrexham. Courtesy of the Bersham Heritage Museum. Hexagonal cannon foundry. See site 10

Snedhill Iron works. Site 34 Courtesy of the IGMT.

Nearby is the East Bersham Museum.

- ## D FLINTSHIRE
18. Mold coal, lead and iron ore mines, 6 steam engines.
 19. Hope Mountain limestone quarry and kilns.
 20. Ffrith limestone quarry and kilns.
 21. CANAL Flint Coal Canal.

- ## E CHESHIRE
22. Chester Port and Preston Brook used by Wilkinson for transportation and warehousing.
 23. CANAL - planned to connect Rivers Mersey & Trent.
 24. CANAL - Ellesmere Canal Company who linked the rivers Severn, Dee and Mersey. Including the Llangollen Canal and the famous Pontcysyllte aqueduct built by Thomas Telford.

- ## F SHROPSHIRE
25. Investment and planning of the first iron bridge between Broseley and Madeley Wood - now Ironbridge. See front page.
 26. New Willey Ironworks, Broseley, est 1757 where John bored very accurate cannon and B&W cylinders. In 1776 John installed the second Boulton and Watt beam engine to replace his Newcomen engine which was the first steam driven blast furnace in the World.
 27. HOME - The Lawns, Broseley that has one of his iron tanks. In 1800 he leased it to John Rose of Coalport China. See pictures.
 28. WATERWAY - River Severn was made navigable from Shropshire to Chepstow and Bristol.
 29. CANAL - Shrewsbury Canal, 1796.
 30. CANAL - Shropshire Canal Navigation, 1772.
 31. Willey Wharf (and Benthall Wharf at Ironbridge) on the River Severn were connected by 3 miles of iron rails to New Willey.
 32. BANK - Ironbridge Bank.
 33. BANK - Eyton, Reynolds & Wilkinson, Shrewsbury, 1793.
 34. Snedhill Works, Oakengates est. 1780, - 2 blast furnaces, coal mines and iron ore quarry. Bought by Lilleshall Co in 1816.
 35. Hollinswood ironworks est. 1787, nr Snedhill.
 36. Hadley est 1804 nr Wellington two blast furnaces with hot blast for heat saving, that is used today in everything from jet engines to boilers, Also coal mines and iron ore mines, & seven steam engines.

- ## G STAFFORDSHIRE
37. BANK - Bradley Ironworks Bank.
 38. BANK - Wilkinson & Co Bank at Bilston.
 39. Bradley Ironworks was an 88 acre integrated iron works, est. 1767, including Hallfields Colliery, rolling mills, wrought iron, boiler making, slitting, pottery, gun and engine boring, brickworks, chemical plants, canal warfs and a village. - see picture overleaf
 40. Commemorative plaque showing where Wilkinson erected the Black Country's first steam-engine driven blast furnace in 1767. See picture below.
 41. His Bradley Iron chapel was demolished but the iron pulpit is now in the Bradley Methodist Chapel.
 42. Gave cast iron copy books containing sand for school children to write on using an iron skewer, because paper was so expensive.
 43. Darlaston - Mines at Barebones and Heathfield.
 44. HOME - Bradley Manor, where he died in 1808, aged 80 after working all his life. The manor has now been demolished.

- ## H BIRMINGHAM
45. Birmingham Warehouse Company for copper & tin.
 46. BANK - Wilkinson, Startin, Smith & Smith, Union St.
 47. CANAL - Birmingham Canal Navigation Company (BCN).
 48. Soho Birmingham - Wilkinson made engine parts for Boulton and Watt beam engines, which effectively made him the third partner in the engine business. See overleaf cols 2 to 6.
 49. Mathew Boulton made token coins by the ton for Wilkinson at Soho. See front page and 16 in column 3 overleaf.

- ## I LONDON
50. Lead pipe works and solder production at Rotherhithe by Tower Bridge today - was HJ Enthoven, the lead (battery) recyclers.
 51. Gun wharf with five quays and ten warehouses at Rotherhithe to supply the Royal Arsenal where the cannon were tested.

INVESTMENTS IN COPPER, TIN, AND ARSENIC MINING

Wilkinson invested in the following mines listed below. John sold B&W engines produced with his parts replacing Newcomen engines. Thus reducing coal consumption to a quarter and lowering expensive transport costs. He also sold parts such as clack valves and pipes.

- ## J ANGLESEY
52. Mona Copper Mine, Parys was the largest and cheapest open cast mine in Europe. Wilkinson supplied iron to extract copper from low grade ores by cementation. The majority shareholder was Copper King Thomas Williams. See also 61 and 62 below.

- ## K CORNWALL
53. Consolidated Mines, Gwennap, 19 engines by various engineers including Boulton and Watt / Wilkinson.
 54. United Mines, Gwennap.
 55. Poldice Mine.
 56. North Downs Gwennap.
 57. Scorrier Mines.
 58. Wheal Busy between Redruth and Truro, was the first Cornish mine to have a Boulton and Watt engine in 1777.
 59. Tresavean Mine - Boulton and Watt engine 1779.
 60. Chacewater Mine - Boulton and Watt engine 1778.

Other interests with Thomas Williams the Anglesey Copper King in Flintshire and Swansea

61. Greenfields Copper and Brass Company, Holywell, manufacturer of wire, pans, as well as plates and bolts for Royal Navys' ships copper bottoms using copper refined from Mona mine ore.
62. Stanley Smelting* Company, St Helens nr. Liverpool, and Swansea, South Wales. *Extraction of copper from the ore.

Commemorative plaque on Great Bridge Playing Fields, Bradley, inscribed:
Near this spot John Wilkinson erected his first blast furnace in 1767 (in the Black Country). It marked the beginning of the Iron Age in the Black Country and was truly the Mother Furnace of the district. (Due to the amount of iron it produced) Walsall Metropolitan Borough, 1967.

A SUMMARY OF JOHN WILKINSON'S ACHIEVEMENTS AND INVESTMENTS

1. It was Wilkinson's idea with the architect, Thomas F Pritchard, to build the Ironbridge wholly out of iron, between what was then Madeley Wood and Broseley. This publicised the iron trade in the Coalbrookdale area that was becoming a tourist centre due to the industry. Wilkinson then persuaded 12 other investors, mostly from Broseley, to use iron for the bridge and this was how he got his name John 'Iron-Mad' Wilkinson. John had a petition passed by Parliament to build the bridge and the Ironbridge was opened in 1781. It is still the iconic tourist attraction to the area. That's genius!

Wilkinson was the second largest investor in the Ironbridge after Abraham Darby III, who built the bridge using iron made with coke instead of charcoal. This process was developed by Abraham Darby I in 1709 and further developed by Wilkinson to enable the use of coal. This saved the rapidly diminishing supply of trees and enabled the large scale production of cheaper iron that was essential for the Industrial Revolution. Largely due to these factors, the area was given **World Heritage status by UNESCO**.

2. New Willey Ironworks, Broseley est. 1757, here using his amazingly accurate boring machine John made the first **very accurate** cannon (Patent 1063 in 1774) and Boulton & Watt cylinders. In 1775 he installed the second B&W engine which replaced his Newcomen engine that drove the bellows of his blast furnace.

Circa 1759 he built the first iron railway with **flanged wheels of today's design**. It stretched 3 miles from New Willey to Willey Wharf on the River Severn. The railway was twin tracked & horse powered, so that descending trucks pulled up the trucks going uphill. This arrangement can still be seen at the Hay Inclined Plane at Coalport's Blists Hill Museum which was built 33 years later in 1792.

3. **John Wilkinson became the Father of the South Staffordshire Iron Industry.** This was achieved by replacing the inadequate water power supply with steam power to blow the furnaces and drive the machinery at his 88 acre Bradley ironworks, which was established in 1767 in Bliston. This enabled the exploitation of the rich coal and iron deposits and **large scale iron production in Bradley**.

Bradley Ironworks boasted blast and reverberatory furnaces, cupolas, rolling mills, forges, coal mines, brickworks, pottery, gun boring, iron, slitting lines for nail-making strip, a chemical plant, glass works, canal wharfs and homes for his workers he had brought to the area.

By 1778 John was also forging wrought iron which is much tougher than cast iron.

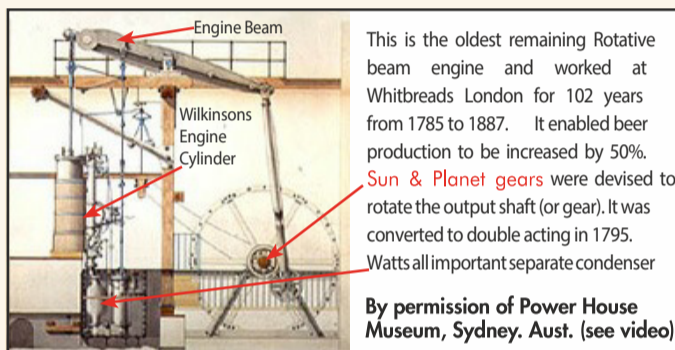
John was instrumental in establishing the BCN Canal that stimulated the growth of the Black Country, Birmingham and his Bradley Ironworks. It connected to Staffs & Worcester Canal and River Severn and the World.



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Bradley Ironworks, Bliston est. 1767 which became the first integrated ironworks, see 3 to the left. Today it is a 1960's housing estate but in its day it was a self contained village and employed 5,000 people. The picture is thought to have been painted from the recreation grounds in Wilkinson Avenue, in Upper Bradley. At one end of the grounds is a memorial mound and on the opposite side of Wilkinson Ave is where the furnace and foundry on the right of the picture are believed to have been situated. The Wilkinson Primary School off Walter Road, has been built here, over the old foundry. On the left of the painting in the distance, is the Birmingham Canal (Now Wednesbury Oak Loop), and today there are the Great Bridge Road Playing Fields in Lower Bradley. Above the smoke on the left is St Bartholomew's Church, Wednesbury.

4. Now also 'steam-mad', in 1783 he installed the first Boulton and Watt **Rotative Beam Engine** at Bradley. Wilkinson was effectively the third partner in the engine business and had pressurised Watt to develop it for driving his forges, slitting and rolling mills. This led to the replacement of water wheels and windmills because it was a more reliable source of **rotational power** for driving rotating machinery without a water wheel. Previously the up and down motion of the beam engines had mainly only been suitable for furnace bellows and driving water pumps to recirculate water for water wheels and pumping out mines.



This is the oldest remaining Rotative beam engine and worked at Whitbreads London for 102 years from 1785 to 1887. It enabled beer production to be increased by 50%. **Sun & Planet gears** were devised to rotate the output shaft (or gear). It was converted to double acting in 1795. Watts all important separate condenser

By permission of Power House Museum, Sydney, Aust. (see video)

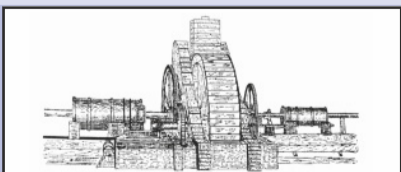
BENEFITS OF JOHN WILKINSON'S INVENTIONS

1. **Amazingly accurate boring of engine cylinders and high quality cast iron** gave him a quasi monopoly on the manufacture of the Boulton and Watt engines in 1775 and so John effectively became the third man in the engine partnership. Prior to this Watt had spent nearly 10 years trying to achieve the required accuracy with Boulton, John Smeaton and other engineers. Consequently he became known as **Father of the Machine Tool Industry**.

This accuracy and Watts design ensured that the B&W beam engines were four times as efficient and powerful as the Newcomen beam engine invented in 1712, which was the world's first successful engine. The first Newcomen was installed at Conygree Coal Works, Nr Dudley Castle (see replica at the Black Country Museum). These improved engineering skills and power to drive machinery enabled large scale production for powering the Industrial Revolution and the British Empire expansion. This amazing accuracy was vital for the later development of the Trevithick and George Stephenson high pressure steam engines that led to the Railway Revolution and boosted the Industrial Revolution.

Wilkinson made the first Boulton and Watt beam engine that was installed at Bloomfield, Tipton and he installed the second one at his Willey iron works, nr Broseley, in 1776. This replaced a Newcomen engine and improved the economy 4 times, the furnace blast, metal temperature and metal quality.

John then encouraged other industrialists to use beam engines instead of water wheels to drive other machines such as forges, furnace blowing bellows, cotton and textile mills etc. This was instead of solely using beam engines to pump water out of mines or pump water to canals or to re-cycle water to keep water wheels going all year round, such as at Abraham Darby's Ironworks at Coalbrookdale, Shropshire. **Using steam power where there was little or no water power now opened almost everywhere to development, such as his Bradley works in South Staffordshire. Yet another step in the Industrial Revolution that led to the astonishing improvement in our standards of living.**



Accurate lathe for turning Boulton & Watt beam engine cylinders - insert cutters were used as today. Drawing by: Ron Davies. Ref 4



1782 Beam Engine cylinder By courtesy of the Bershram Heritage Museum, Wrexham

2. Accurate boring of cannon and accurate cannon balls made cannon more powerful and accurate so the British Navy became formidable.
3. Rifling of cannon in 1789 and breech loading but the military did not adopt them immediately.

4. **Made very accurate cannon that did not explode** (patent No. 1063 in 1774) by boring them from a solid casting made from high quality cast iron, which was enabled by higher furnace temperatures.
5. High quality and the inventions 2 and 4 gave the **Royal Navy a major advantage over Britain's enemies**. eg Battle of Trafalgar in 1805 also battles of The Nile, Copenhagen, Malta, and many others. **These improvements had been recognised as necessary since 1716 or even for 200 years.** Also Wilkinson was an investor in the copper industry supplying **copper bottoms for Royal Navy ships**, including HMS Victory to make them faster and more maintenance free because seaweed etc would not grow on copper and it prevented beetles boring holes into the hulls. **This success enabled Britain to trade freely with the World, and generate more income for investment in the industrial revolution.**
6. 1758 his father Isaac, patented the casting of metal in dry sand and in metal boxes, which is still used. Also patented clothes iron in 1758.
7. **A Wilkinson trained craftsman, Richard Roberts** invented the planer for machining flat surfaces on metals etc and it is still used today while his automatic spinning mule was still being used until the 1950's. Roberts has also been described as the most important mechanical engineer of the 19th century.
8. 1757, Blowing furnaces using steam engines, cast iron bellows and accumulators to make furnaces burn hotter, more efficiently and faster. This enabled the iron quality to be improved and different grades of iron to be made, including grey cast iron that is very machinable and has self lubricating properties suitable for the Boulton and Watt beam engines as well as **today's engines** to give them a longer life.

John Wilkinson possibly the richest industrialist of his time

Like modern day entrepreneurs, in addition to his own businesses, he would buy other interests to help ailing businesses and sell others in order to invest elsewhere, such as in the Paris water supply, canals, and the copper industry in Cornwall and Anglesey. A ballad was written in praise of his good works that ends - **And Wilkinson's fame blaze a thousand years hence.**

Philanthropist and good brother in law

John Wilkinson's sister married Dr Joseph Priestley of the Lunar Society-famous for the discovery of 10 gases including oxygen, the invention of soda water, as an educationalist, anti-slavery campaigner, dissenting clergyman and a free thinker in the Enlightenment period. However he was a sympathiser with the French Revolution and thought to be anti-royalist, consequently during the Birmingham riots of 1791 his house was burnt down with his papers and belongings. Wilkinson gave him £10,000 (£1m+ today) which enabled Priestley and his family to emigrate to America for safety. *His home in Pennsylvania is a museum.* Amongst other philanthropy Wilkinson introduced pensions & built an iron church at Bradley with an iron pulpit.

Friends and Business Associates

We often think of great names as if they were islands in time and society but the truth is different, because John Wilkinson was in association with many very influential, industrialists, farmers, scientists, engineers and free thinkers of the Enlightenment. These included the RSA and members of the Lunar Society who met monthly, often at Soho House (museum), Birmingham, home of Matthew Boulton, celebrated maker of silverware, coinage, silver buttons and buckles etc. Also Josiah Wedgwood and Erasmus Darwin who were both grandfathers of Charles Darwin, were also members of the Lunar Society.

Written by Richard Sells (awarded the Wilkinson gold medal by the SISI) with thanks to the Broseley Local History Society (BLHS) (formerly the Wilkinson Society), Special thanks to John Freeman (Trustee IGMT). Also Steve Grenter and Jon Gammond of the Bershram Heritage Museum and Colin Davis of the Brymbo Heritage Group.

- 1 The Social Impact of John Wilkinson, by Vin Calcutt. See www.broseley.org.uk
- 2 The Journals of Samuel More 1776, Secretary of the RSA
- 3 John Wilkinson King of the Ironmasters, by Frank Dawson. Available from: BLHS.
- 4 John Wilkinson's Railway at Willey by Neil Clarke of the BLHS.
- 5 John Wilkinson 1728 - 1808, English Ironmaster and Inventor, by Prof. Norbert C. Soldon

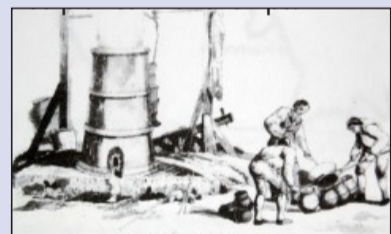
Edition 3, 09/2022

- 6 John Wilkinson Ironmaster Extraordinary, by Ron Davies. Available from: BLHS.
- 7 The Bradley Ironworks of John Wilkinson by GR Morton and WA Smith - JISI July 1966. Wolverhampton Archives
- 8 HMS Victory - Image © National Maritime Museum Greenwich
- 9 John Wilkinson Ironmaster, by Leighton A Wilke, Do All Company USA
- 10 Exactly, by Simon Winchester OBE

This pamphlet and further information are available on: www.broseley.org.uk

5. Bradley, Bliston, 1776 John began boiler-making very successfully with puddled iron and rolled wrought iron. The puddling 'burns' harmful impurities out of the iron, while forging and rolling squeezed out slag which gives the iron a worked and toughened string-like structure when rusty. These 'strings' can be seen in heavily rusted wrought iron today. See the anchor at Coalbrookdale Museum of Iron.
6. Wilkinson had six ironworks with rolling mills, forges, limestone quarries, coal and iron ore mines. By 1796 he was producing 12.5% of Britain's pig iron. He was also producing large amounts of wrought iron.
7. Interests in nine copper mines, including the Parys opencast mine in Anglesey which provided the copper ore for the copper bottoms and bolts for the Royal Navy ships. See *map ref. 61 & 62 overleaf and BENEFITS No. 4 below*.
8. Brass and copper products: e.g. rolled strip products for Birmingham non-ferrous fabricators.
9. Many inventions e.g. Accurate engine cylinders and cannon boring, prevention of cannon exploding, rifling, addition of manganese to iron, iron boats, iron tanks, reverse rolling, drawing of lead pipes, cupola furnaces and many others.
10. Five Lead Mines and lead products e.g. pipes, solder.
11. Chemical plants, e.g. tar, pitch and varnish.
12. Invested in seven canals e.g. BCN Canal that opened up trade to the Black Country, Birmingham as well as his Bradley Ironworks. See *'CANAL' list overleaf and item 3 above*. Also John was a trustee of various roads.
13. Six homes: e.g. The Lawns, Broseley, was his HQ for 30 years and Castlehead, Cumbria was his retirement home. See *HOMES overleaf*.
14. Local stockholding of copper etc for the industries in Birmingham, Liverpool, London and Bristol.
15. Ownership and interests in five banks. See *'BANKS' overleaf*.
16. Issued tons of copper 'coins' displaying his head, instead of the monarchs, due to the government not minting enough small denominations, especially for the working man. Tokens were redeemable at his banks and often called Willeys after his Willey Ironworks. See *front page*.
17. He developed 2000 acres of farms, which included land improvement such as reclaiming 500 acres from the sea and converting 150 acres of heathland to agriculture also he had a steam powered threshing machine in 1798.

9. **World's first iron boat in 1787**, a 70 foot iron barge was launched at Willey Wharf in front of crowds who thought it would sink. Iron boats were longer lasting and safer than wooden ones, so eventually they became the standard for barges and tub boats on inclined planes and for ships
10. Reversing rolling mills greatly improve speed and efficiency because they save time in the rolling and in hot rolling they give the iron less time to cool, so less re-heating is necessary. They are still used today.
11. Addition of manganese to iron (and steel) was a major step forward in making iron tougher and is used today. High percentages give wear resistance.
12. Developed hydraulic accumulators for an even blast from the bellows.
13. Drawing of lead pipe onto an iron mandrel improved quality and economy. (Patented 1790). This was the forerunner of **modern tube drawing**.
14. Cupolas, Wilkinson patented these furnaces in 1794 for re-melting metal/scrap and improving the metal quality. They were the first furnaces to be encased in iron and enabled many foundries to be set up around the world, especially for iron castings, because they are very fast and efficient. At Brymbo Ironworks there are two 20th century versions of Wilkinson's cupola built in 1952. See *Wrexham site 13 overleaf and picture opposite*. There is also a cupola at Blists Hill Museum, Ironbridge.



Cupolas are typically all heights up to about 20m. The 1803 version shown here is casting cannon balls. IGMT

