

Sites of John Wilkinson's UK Activities, Investments and Businesses - Was he down your way?

A CUMBRIA

- 1 Little Clifton, 'birthplace' - 1728, **born in a cart between his home and Workington market.**
- 2 Kendal - He attended a Unitarian Academy run by the Rev. Dr Caleb Rotherham. This was not just a theological academy so John learnt mathematics, science and modern languages for the engineering future his father Isaac planned for him.
- 3 Backbarrow blast furnace, in 1736 Isaac, who was a shepherd, became a pot founder and then chief pot founder in 1740 aged 40. This site is to become a museum.
- 4 By 1735 Bare Syke, Backbarrow was the home of John's father Isaac, where he cast iron pots from the Backbarrow blast furnace. In 1738 he patented a flat iron for ironing clothes.
- 5 Wilson House, Lindale was Isaac's home in 1744 and by then he had three boys and two girls. Isaac had his own furnace here.
- 6 HOME - John's 'Retirement' home at Castlehead. (see picture) In the foreground are 500 acres he reclaimed from the sea. Today it is the Castlehead Field Study Centre.
- 7 Lindale - 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. Initially the monument was at Castlehead then moved to Lindale in 1863. See picture below.

B LIVERPOOL - see also site 62

- 8 Ironmonger apprenticeship from 1745 to 1750.
- 9 Wilkinson used the port for moving cannon by sea to London, also his token coins could be exchanged for coin of the realm.

C WREXHAM

- 10 Bersham Ironworks, nr Wrexham was taken over by John's father in 1753 and later it was run by John and his brother William. In the 1750's Isaac was using coke as well as charcoal for iron production. Later John made boilers, beam engine cylinders and cannon here which were at the leading edge of their technologies. Some of the works can be still seen today at West Bersham and East Bersham Museum. See pictures
- 11 HOME - Brymbo Hall, demolished 1973 for mining.
- 12 HOME - The Court, Fecham Hightown Wrexham, the home of William Wilkinson - John's younger brother.
- 13 Brymbo Ironworks, established 1796. The Brymbo Estate included 872 acres used for many mines. John also farmed it and converted 150 acres of wild heath to agriculture. GKN made carbon and electrical 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.

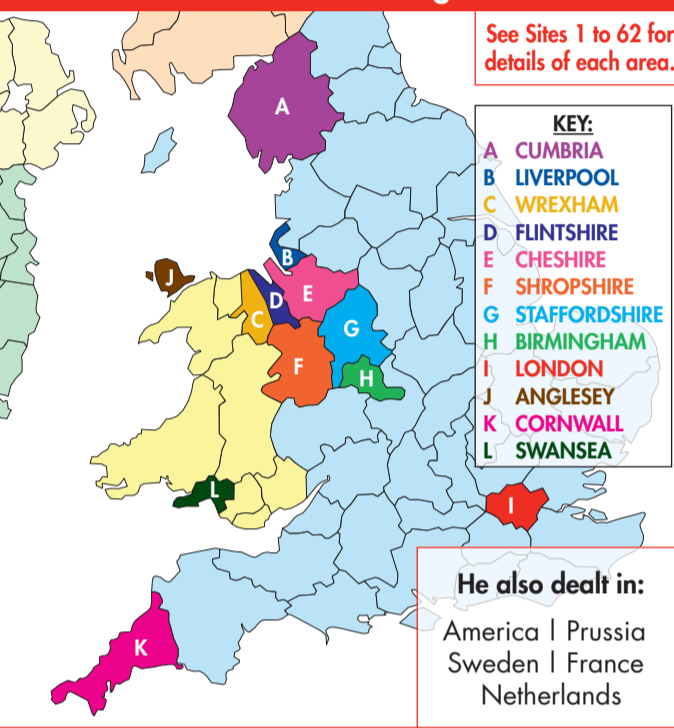
INTERNATIONAL BUSINESS

As well as his activities in England and Wales, Wilkinson had sales and investments in America, Sweden, Prussia, Netherlands and France but it is outside the limited scope of this pamphlet to show all of these sites of activity. The map and the list below show most of the sites in England and Wales.

Notably however, he was an investor in the Paris water system and supplied 40 miles of pipes and engines to Paris Water. In 1775, his brother William, was persuaded by the French to leave the foundry at Bersham to set up factories for them. Bersham Ironworks had been established by their father Isaac, see site 11 below 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, judgement of character and management skills even more remarkable, an administrative genius in fact. He was indeed perhaps the greatest entrepreneur of his time.

MAP of John Wilkinson's Empire of Activities, Interests and Investments in England and Wales



WHO WAS 'IRON-MAD' WILKINSON?

He was the leading Ironmaster, entrepreneur and inventor of his day who also expanded the use of steam power.



Cannon for Nelson's ship Victory and many others

Photo by ref. 8



The World's first iron bridge was John Wilkinson's idea. See column 1 overleaf

Image by courtesy of the IGMT



Trade token coinage e.g Willys see item 16 overleaf

Photo by ref. 1

John (Iron-Mad) Wilkinson 1728 - 1808

- He inspired the World's first iron bridge and boat.
- 'King of the Ironmasters', said Thomas Telford.
- Father of the South Staffs Iron Industry.
- Father of the machine tool industry and so enabled steam engine development and revolution.
- Acclaimed for his advanced farming methods.
- He was the first true industrialist and he drove forward the early Industrial Revolution.

He is an inspiration for today's entrepreneurs

Version II - Jan 2015

The author at the 40ft high cast iron John Wilkinson column in Lindale. See site 7 above



No1 Furnace at Brymbo, which ran from 1796 to 1894. (See site 13 above.)

Drawn by Ron Davies, Ref 4. Also there are two 20th century versions of Wilkinsons cupola furnace.

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



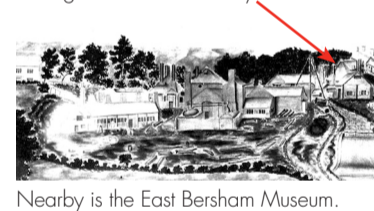
The Lawns, Broseley was his home and HQ for 30 years. See site 27



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



Nearby is the East Bersham Museum.

Snedshill Iron works. Site 34 Courtesy of the IGMT.



- 16 Ruabon - lead mines and lime kilns.
- 17 Caello lead smelting house, there are some remains visible.

D FLINTSHIRE - see also site 61

- 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 was not completed

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. This includes 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, nr Ironbridge, est 1757 where he bored cannon. In 1775 he installed the second Boulton and Watt beam engine to replace his Newcomen engine
- 27 HOME - The Lawns, Broseley that has one of his iron tanks. In 1800 he leased it to John Rose of Coalport China - picture above
- 28 WATERWAY River Severn was made navigable from Shropshire to Chepstow and Bristol
- 29 CANAL Shrewsbury Canal (1796)
- 30 CANAL Shropshire Canal Navigation (1792)
- 31 Willey Wharf and Benthall Wharf at Ironbridge on the River Severn were connected by 3 miles of iron rails to Willey.
- 32 BANK - Ironbridge Bank
- 33 BANK - Eyton, Reynolds & Wilkinson, Shrewsbury (1793)
- 34 Snedshill Works, Oakengates est. 1780, two blast furnaces, coal mines and iron ore quarry. It was bought by the Lilleshall Co in 1816.
- 35 Hollinswood ironworks est. 1787, nr Snedshill
- 36 Hadley, nr Wellington two blast furnaces with hot blast for heat saving, **used today** in everything from jet engines to boilers, coal mines and iron ore mines, seven steam engines, est 1804.

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.
- 40 Commemorative plaque showing where Wilkinson erected the **first** steam-engine driven blast furnace in 1767 - see picture bottom right.
- 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 schoolchildren to write on using an iron skewer.
- 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 is now demolished.

H BIRMINGHAM

- 45 Birmingham Warehouse Company for copper & tin
- 46 BANK - Wilkinson, Startin, Smith & Smith, Union St.
- 47 CANAL - Birmingham Canal Navigation Company.
- 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 now HJ Enthoven (Quexco Inc), 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

John Wilkinson invested in the following mines and sold them engines made with his parts to add to or usually replace Newcomen engines, also other parts such as clack valves and pipes.

J ANGLESEY

- 52 Mona Copper Mine, Parys was the largest and cheapest open cast mine in Europe. 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 Wheel 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(D) and Swansea(L)

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



See site 40: Commemorative plaque on Great Bridge Playing Fields, Bradley, inscribed: **Near this spot John Wilkinson erected his first blast furnace in 1767. It marked the beginning of the Iron Age in the Black Country and was truly the Mother Furnace of the district.** (Because it made so much iron) Walsall Metropolitan Borough 1967.

A summary of John (Iron-Mad) 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 would also publicise 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. He also got the petition passed by Parliament and then the first ribs of the bridge were erected in 1779 and it was opened in 1781.

Wilkinson was much the second largest investor in the Ironbridge after Abraham Darby III, who built the bridge using iron made with coke instead of charcoal. This was a process developed by Abraham Darby I in 1709 and later 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 necessary for the Industrial Revolution. Largely as result of these factors, the area was given **World Heritage** status.

2 **Willey Ironworks, Broseley** est. 1757 was where he made cannon and installed the second Boulton and Watt steam engine.

Also he built a 3 mile iron railway to the River Severn with as 'fine a track as could be wished' for the horses pulling the wagons. (Ref 2. Samuel More 1776) By 1776 the initial wooden railway had been converted to iron rails with **flanged wheels on the wagons as used today**. On steep hills he ran inclined planes where a descending empty wagon was connected by a rope or chain to a full one to help pull it up the hill, as used for tub boats on the Hay Inclined Plane, Coalport 1792.

3 He became the Father of the South Staffordshire Iron Industry by replacing the inadequate water power supply with steam power to blow the furnaces and drive the machinery. This enabled the exploitation of the rich coal and iron deposits and **large scale** iron production. In 1767 Wilkinson established an 88 acre **integrated iron works** at Bradley, Bilston with blast furnaces, reverberatory furnaces, cupolas, rolling mills, forges, coal mines, brickworks, pottery, gun boring, iron for nail-making, chemical plant, glass works, canal wharfs and homes for his workers he had brought into the area. By 1778 he was also forging wrought iron which is much tougher than cast iron.

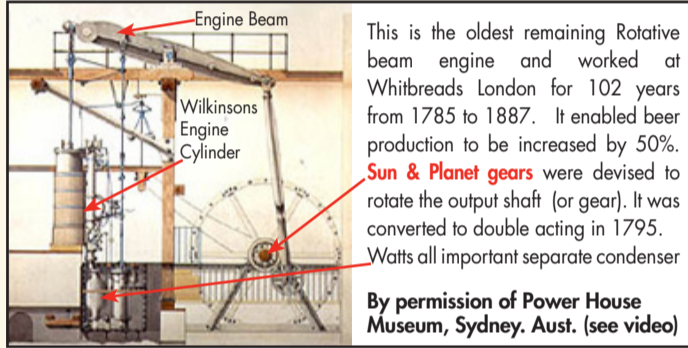


Reproduced by the kind permission of the William Salt Library, Stafford

Bradley Ironworks, Bilston 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**.

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, which Wilkinson, **as effectively the third partner** in the engine business, had pressurised Watt to develop for driving his forges, slitting and rolling mills. This led to the replacement of water wheels and windmills etc 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 driving water pumps and furnace bellows.



This is the oldest remaining Rotative beam engine and worked at Whitbread's 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)

See also Birmingham and London Science Museums for further details

5 In 1786 at Bradley, Bilston he began boiler-making very successfully with puddled and **rolled wrought iron**. The puddling 'burns' harmful impurities out of the iron, while forging and rolling squeezed out slag and gives the iron a worked and toughened string-like structure. These 'strings' can be seen in heavily rusted wrought iron. See anchor at Coalbrookdale Museum of Iron.

6 Wilkinson had nine ironworks with rolling mills, forges, coal mines, iron ore mines and limestone quarries. By 1796, he was producing 12.5% of Britain's pig iron, as well as 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 also map ref. 61 & 62 overleaf and **BENEFITS** N° 4 below.

8 Brass and copper goods: e.g. rolled strip products.

9 Many inventions e.g. Accurate engine cylinder and cannon boring, prevention of cannons 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 products e.g. pipes, solder.

11 Chemical plants, e.g. tar, pitch and varnish.

12 Invested in seven canals – see '**CANAL**' list overleaf. Also he 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 Warehousing to provide a local stockholding of copper etc for the industries in Birmingham, Liverpool, London and Bristol.

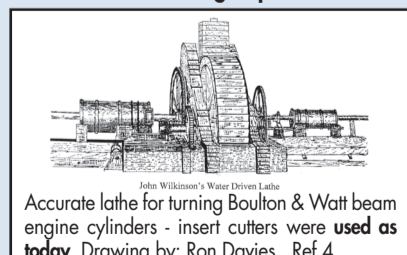
15 Ownership and interests in five banks, see '**BANKS**' overleaf.

16 Issued tons of copper 'coins' displaying his **own 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 **Willey's** after his Willey Ironworks.

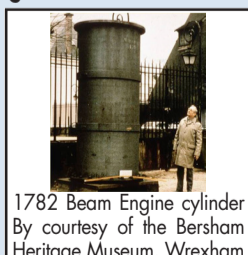
17 He developed 2000 acres of farms, which included land improvement such as reclaiming 500 acres from the sea and converting 150 acres of heathland to agriculture also he had a steam powered threshing machine in 1798.

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 (1775) and he 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 three 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 even more necessary for the later development of the Trevithick and George Stephenson high pressure steam engines that led to the 'Railway Revolution'. Wilkinson **made and installed** the first Boulton and Watt beam engine 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 3 times, the furnace blast, metal temperature and metal quality. He 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 **our astonishing improvement in living standards**



John Wilkinson's Water Driven Lathe
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 Bersham Heritage Museum, Wrexham

2 **Accurate boring** of cannon and accurate cannon balls made cannons more powerful and accurate.

3 **Rifling of cannon in 1789 and breech loading** but the military did not adopt them immediately.

4 **Made 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.

High quality and the inventions 2 and 4 gave the Royal Navy a major advantage over Britain's enemies eg in the French 7 year war 1756 – 1763, the Battle of Trafalgar in 1805 and many others. These improvements had been recognised as necessary since 1716.

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 the copper and they prevented beetles boring holes in the hulls.

5 1758 his father Isaac, patented the casting of metal in dry sand and in metal boxes, which is **still used**.

6 A Wilkinson trained craftsman, Richard Roberts invented the planer for machining flat surfaces on metals etc and is **still used today**. His spinning wheel was still being used until the 1950's. Roberts has also been described as the most important mechanical engineer of the 19th century.

7 1757, **Blowing furnaces using steam engines and cast iron bellows** to make furnaces burn hotter, more efficiently and faster. This enabled iron quality to be improved and different grades of iron to be made, including **grey cast iron** that is very machineable 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.

8 **World's first iron boat in 1787**, a 70 foot iron barge was launched at Willey Warf in front of crowds who thought it would sink. Iron boats were longer lasting than wooden ones, so eventually they became the standard for barges and tub boats on inclined planes and for ships.

9 **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**.

10 **Addition of manganese to iron** (and steel) was a major step forward in making iron tougher and is **still used today**. High percentages give wear resistance.

11 Developed **hydraulic accumulators** for an even blast from the bellows. They have many applications **today**.

12 **Drawing of lead pipe** on to an iron mandrel that improved quality and economy (patented 1790). This was the **forerunner of modern tube drawing**.

13 **Cupolas**, he 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, especially for iron castings. At Brymbo Ironworks there are two 20th century versions of Wilkinsons cupola built in 1952. See Wrexham site 13 overleaf and picture opposite.



Cupolas are **still used today** and are typically 'all' heights up to about 20m. The 1803 version shown here is casting cannon balls.
Image courtesy of the IGMT

John Wilkinson the Entrepreneur and 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 Wilkinsons fame blaze a thousand years hence.

Philanthropist and good brother in law

John Wilkinson's sister married **Dr Joseph Priestley** of the **Lunar Society** who is famous for the discovery of oxygen, the invention of soda water, as an educationalist, anti-slavery campaigner 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 eventually emigrate to America for safety. Amongst other philanthropy Wilkinson **introduced pensions** and 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 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 Wedgewood and Erasmus Darwin, both grandfathers of Charles Darwin.

Written by Richard Sells 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 Bersham 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. Soldan

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

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

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