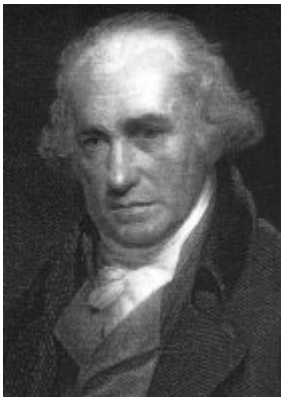
# JAMES WATT THE LUNATICK



Steam was, till the other day, the devil which we dreaded. Every pot made by any human potter or brazier had a hole in its cover, to let off the enemy, lest he should lift pot and roof, and carry the house away. But the Marquis of Worcester, Watt, and Fulton bethought themselves, that, where was power, was not devil, but was God; that it must be availed of, and not by any means let off and wasted. Could he lift pots and roofs and houses so handily? he was the workman they were in search of. He could be used to lift away, chain, and compel other devils, far more reluctant and dangerous, namely, cubic miles of earth, mountains, weight or resistance of water, machinery, and the labors of all men in the world; and time he shall lengthen, and shorten space.

It has not fared much otherwise with higher kinds of steam. The opinion of the million was the terror of the world, and it was attempted, either to dissipate it, by amusing nations, or to pile it over with strata of society, — a layer of soldiers; over that, a layer of lords; and a king on the top; with clamps and hoops of castles, garrisons, and police. But, sometimes, the religious principle would get in, and burst the hoops, and rive every mountain laid on top of it. The Fultons and Watts of politics, believing in unity, saw that it was a power, and, by satisfying it, (as justice satisfies everybody,) through a different disposition of society, — grouping it on a level, instead of piling it into a mountain, — they have contrived to make of his terror the most harmless and energetic form of a State.

## "NARRATIVE HISTORY" AMOUNTS TO FABULATION, THE REAL STUFF BEING MERE CHRONOLOGY

# 1698

Thomas Savery's "fire engine," the first working steam engine, amounted to a pump operated by steam power which had no moving parts.

## THE SCIENCE OF 1698

**DO I HAVE YOUR ATTENTION? GOOD.**

# 1705

In 1698, Thomas Savery had patented a steam engine. When Herr Professor G.W. von Leibnitz sent Denis Papin a sketch of a steam engine, Papin began working on that topic again and would author THE NEW ART OF PUMPING WATER BY USING STEAM (1707). He designed a safety valve to prevent the pressure of steam building up to dangerous levels. Other inventions which Papin worked on were the construction of a submarine, an air gun, and a grenade launcher. He tried to build up a glass industry in Hesse-Kassel and also experimented with preserving food both with chemicals and using a vacuum.

This was the year, however, of Thomas Newcomen's improved "fire engine." Applying Thomas Savery's principle of the condensation of steam to produce a vacuum, he applied the atmospheric pressure not to shove a column of water up a pipe but to shove a metal piston from one end to another of a cylinder. This device was more general in its application because it produced a mechanical motion which could then be used to drive anything: for instance, it could drive a conventional water pump — but it could also turn the crank of a spinning machine.

## THE SCIENCE OF 1705

# 1712

In this year, at some point, Denis Papin, the developer of a steam engine, died in London, England. In this year, at some point, some half century or more before James Watt, Thomas Newcomen developed a workable steam pump for use in mines.

## THE SCIENCE OF 1712

# JAMES WATT

JAMES WATT

## 1736

January 19, Monday (1735, Old Style): James Watt was born in Greenock on the Clyde River in Scotland in the year in which Jonathan Hulls would be patenting a boat propelled by a steam Newcomen engine and in which John Harrison's Chronometer #1 was being evaluated by the British Navy as being exceedingly accurate, but as rather large and heavy.

## NOBODY COULD GUESS WHAT WOULD HAPPEN NEXT

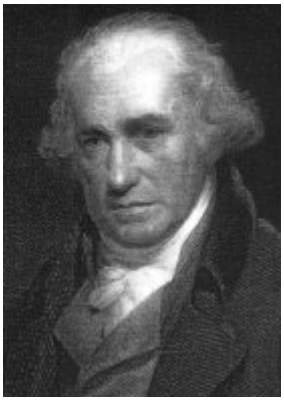
# JAMES WATT

JAMES WATT

## 1755

The firm of Matthew Boulton moved to larger premises at the Sarehole Mill in Hall Green, where they would be able to produce and process sheet metal.
At the age of 19, as James Watt was being sent to Glasgow to learn the trade of a mathematical-instrument maker, he was granted a patent by Parliament that prevented anybody else from making a steam-engine like one he had developed. (Don't ask me how a 19-year-old was able to pull this off — it must have been more or less like the skinny Harvard dropout Bill Gates going "Hey, Big Blue, why don't you concentrate on the computer hardware business while I take care of this messy software problem for you," and IBM Company going "Hey, great idea, kid, let's shake on it, OK?") For the quarter century after he had created a useful machine, the Boulton & Watt company that he and Boulton would create would hold a virtual monopoly over

the production of such steam engines. Watt would charge his customers a premium for using his steam engines by comparing his machine with the horses it was obsoleting. Watt calculated that a draft horse had been able to exert a steady push of 180 pounds on its harness collar, and therefore, when he made a steam engine, he would describe its power in relation to those draft horses, i.e. "a 20-horsepower engine." Watt calculated how much each company would save by using his machine rather than a harnessed team of draft horses.
The company then needed to pay him a third of this figure every year for the next 25 years! When James Watt would die in 1800 he would be a very wealthy man.



JAMES WATT

JAMES WATT

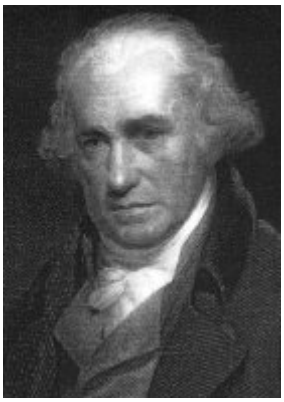
## CHANGE IS ETERNITY, STASIS A FIGMENT

# JAMES WATT

JAMES WATT

## 1757

After having spent a year in London, James Watt returned to Glasgow to establish his own instrument-making business. Watt would soon develop a reputation as a high-quality engineer and would be employed on the Forth & Clyde Canal and on the Caledonian Canal. He would also be engaged in the improvement of harbours and in the deepening of the Forth, Clyde, and other rivers in Scotland.



# 1763

James Watt was sent a Newcomen steam engine to repair. While putting it back into working order, Watt discovered how he could make the engine more efficient. Watt worked on the idea for several months and eventually produced a steam engine that cooled the used steam in a condenser separate from the main cylinder. James Watt was not a wealthy man so he decided to seek a partner with money. John Roebuck, the owner of a Scottish ironworks, agreed to provide financial backing for Watt's project.

In about this year Dr. Erasmus Darwin, an inveterate tinkerer, sketched a design for a steam car and suggested a joint project with Matthew Boulton to construct such a self-powered vehicle. (Nothing would come of this, else there might have been a car designated the Darwin rather than a car designated the Porsche.)[1]

1. Guess what! The first self-powered road vehicle, developed in France in 1769, would be a failure and would be consigned to the Warehouse of Bad Ideas after a road accident in 1771 — and this first self-powered road vehicle would be a failure **because it neglected to use an effective steering mechanism such as the arrangement that had already been developed by** Dr. Darwin **in England**.

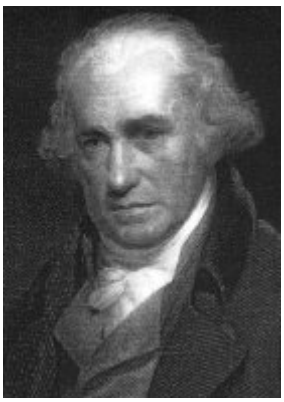
Guess what! Dr. Darwin would not be the only person to come to Boulton & Watt with the idea of a self-powered vehicle. One of their own engineers, William Murdock, would construct such a vehicle in Cornwall in 1784 — and **after he had on his own hook produced a functioning prototype they would extract a promise from him that he abandon it entirely**.

# JAMES WATT

JAMES WATT

## 1764

More than a hundred of Thomas Newcomen's steam engines, invented two generations earlier, were by this point in operation. While repairing a model Newcomen steam engine, James Watt became aware that it was wasting a portion of its steam energy and became interested in rectifying the design.



**LIFE IS LIVED FORWARD BUT UNDERSTOOD BACKWARD?**
**— NO, THAT'S GIVING TOO MUCH TO THE HISTORIAN'S STORIES.**
**LIFE ISN'T TO BE UNDERSTOOD EITHER FORWARD OR BACKWARD.**

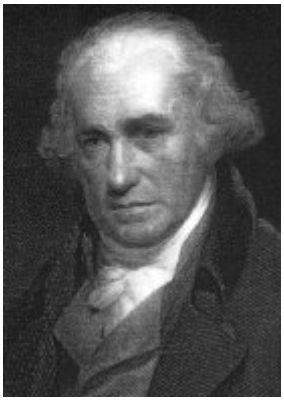
# JAMES WATT

JAMES WATT

## 1765

May: It was at this point that James Watt achieved his 1st and greatest invention, the separate condenser for steam engines, which he would later patent.

STEAM ENGINES

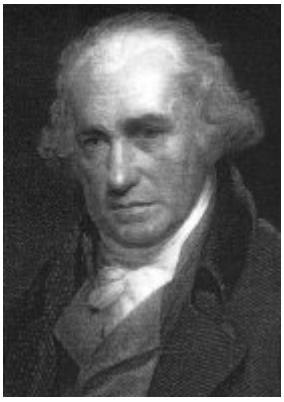


# JAMES WATT

JAMES WATT

## 1766

James Watt became a surveyor.



# JAMES WATT

JAMES WATT

## 1767

Dr. Erasmus Darwin met James Watt and Dr. Samuel Johnson.

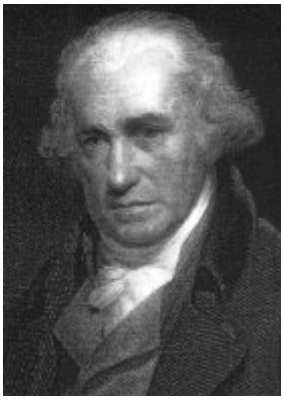
# JAMES WATT

JAMES WATT

## 1769

James Watt obtained a patent on a technique for “A New Invented Method of lessening the Consumption of Steam and Fuel in Fire Engines.” He had recognized that worst inefficiency of the Newcomen design was the heat required to convert a substance back and forth between its solid and its liquid phase, known as “latent heat,” and his new design minimized this problem by effecting condensation in a chamber connected to the engine cylinder but distinct from it.

HISTORY OF RR
STEAM ENGINES

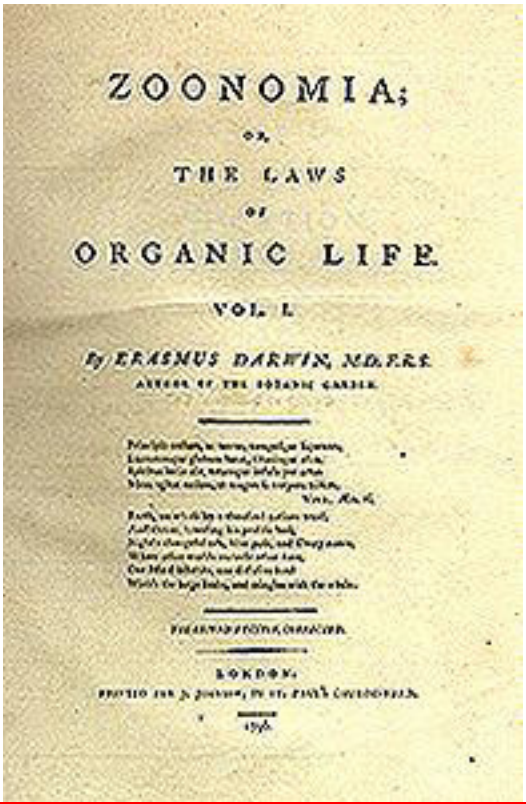


**THE FUTURE IS MOST READILY PREDICTED IN RETROSPECT**

# 1770

Dr. Erasmus Darwin had his portrait done, by Joseph Wright, and began the writing of ZOONOMIA.[2]

His deep small pox pits were of course omitted from the painting.


ZOONOMIA;

OR,

THE LAWS

OF

ORGANIC LIFE.

VOL. I.

By ERASMUS DARWIN, M.D. F.R.S.

LONDON:

1770

## THE SCIENCE OF 1770

His wife Mary (Polly) Howard Darwin died "after a long and suffering illness." The grandson Charles Robert

2. Although Dr. Darwin's grandson Charles Robert would read ZOONOMIA at the age of 16 or 17, he would report later in life that the poem had been without effect on his mind. He hadn't even retained a memory of what his family's motto *E conchis omnia* was, or what it signified.

would report that "judging from all that I have heard of her, [she] must have been a superior and charming woman." "They seem to have lived together most happily during the thirteen years of their married life, and she was tenderly nursed by her husband during her last illness."

In this year he had the new motto *E conchis omnia*, "Everything from shells," added to the painting on his coach door of the Darwin family's coat of arms (which had pictured three scallop shells). The image below is not what was painted on his coach door, but what he would have engraved for a bookplate in the following year:


Unfortunately, the Canon of Lichfield Cathedral, the Reverend Thomas Seward (father of the poet Anna Seward who would fall in love with Dr. Darwin, would be rejected for another, and, after her love's death, would author a scathing and demonstrably false biography), would spot the reference, and –in satirical verse– would accuse his neighbor of renouncing his creator, and would exhort him to change that "foolish motto."

> Great wizard he! by magic spells
> Can all things raise from cockle shells

Dr. Darwin would need to have his coach repainted to remove this offensive material.[3]

PALEONTOLOGY

The biographer Desmond King-Hele acknowledges that it is Charles Darwin, not his grandfather Erasmus, who created the theory of evolution, but seems not to comprehend why this is so:

> Charles Darwin read ZOONOMIA when he was sixteen or seventeen, and also listened to a panegyric in praise of evolution from his

3.Imagine parking in the parking lot of your local fundie church, nowadays, with one of those "Darwin" fish-with-legs logos on the trunk lid of your car! Why was such a motto so offensive? –Because the official story then, which would be the official story during Charles Darwin's life as well, and would be the official story during Henry Thoreau's life, and would be the official story at the Scopes monkey trial in Tennessee, and is still the official story, as for instance the official belief system of the Wubya administration of born-again Christians — is that our lives, to be of significance to us, to be meaningful to us, must have a divine purpose and legitimation. (That's why we attacked Iraq — Wubya's God told him he needed to "take Saddam out." Wubya's administration wasn't mainly about stealing from the poor and giving to the rich. Wubya's life, in fact, post-salvation, has divine purpose and legitimation. It is now a life as full of meaning, as once it was full of drunken revels.)

> friend Dr Robert Grant at Edinburgh University. "At this time I greatly admired the ZOONOMIA," he says. But neither Grant nor ZOONOMIA had "any effect on my mind." This is true: otherwise he would have become an evolutionist before going on the voyage of the *Beagle*, rather than after.

Therefore, perhaps, I should here explicate why it was that creating the theory of evolution was left for Charles, and why it was that the early reading of ZOONOMIA, with its recognition of evolution, did nothing in this regard: it is one thing to regard evolution as a fact, and another thing entirely to create a theory which accounts for it by hypothesizing a plausible mechanism and demonstrating the inevitability of this mechanism. Lots of people regarded evolution as a fact, before Charles created his theory. Almost as many people were perfectly well aware of evolution as a fact in 1770, as had been perfectly well aware in 1491 that the earth was a globe — before Columbus obtained funding to sail west from Spain!

During the 1770s, Erasmus would be helping to found The Birmingham Lunar Society, a social club for the great scientists and industrialists of the day. The society would hold its monthly meetings at the Soho House on the Monday night nearest the full moon, and this supposedly was so that the attenders would afterwards be

able to find their way home. This society has been characterized as the think tank of the industrial revolution. Members of the society included the Reverend Joseph Priestley, discoverer of oxygen, Friend Samuel Galton, a wealthy Quaker industrialist who eventually would be disowned due to his manufacture of firearms, William Small, the eccentrics Thomas Day and Richard Edgeworth, the Matthew Boulton who was known as "the creator of Birmingham," James Watt, William Withering, James Keir, and Josiah Wedgewood.

Other personages linked to this society include Thomas Jefferson, Benjamin Franklin, Rudolph Erich Raspe, and William Murdock, developer of a self-propelled vehicle and the inventor of gas lighting. (Murdock would end his days living at the court of the Shah of Persia, where he would be credited with being an incarnation of Marduk, ancient god of light.)

JAMES WATT

JAMES WATT

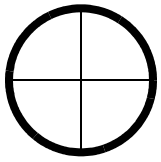
WHAT I'M WRITING IS TRUE BUT NEVER MIND
YOU CAN ALWAYS LIE TO YOURSELF

# JAMES WATT

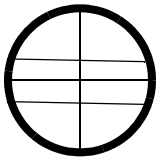
JAMES WATT

## 1771

Stadia hair calibrations, useful in accurately and conveniently determining the distance from the theodolite to the surveying staff, were applied to the surveying telescope by James Watt:



old sight, with crosshairs



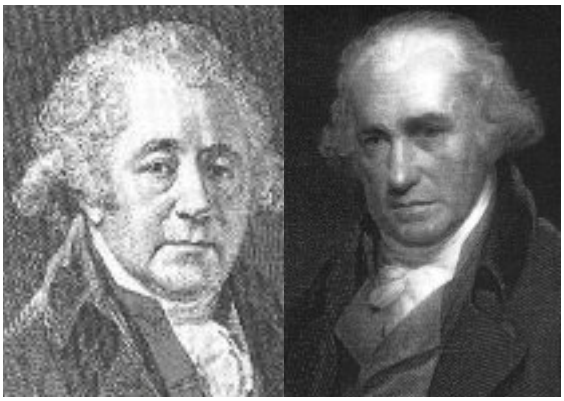
1771, with added stadia hairs

# JAMES WATT

JAMES WATT

## 1773

When John Roebuck went bankrupt, James Watt took his ideas to Matthew Boulton, a successful businessman of Birmingham. For the next eleven years Boulton's factory would be producing and selling Watt's steam engines. These machines would mainly be sold to colliery owners who needed to keep pumping water out of their mines. Watt's machine was very popular because it was four times as powerful as those of the Thomas Newcomen design.

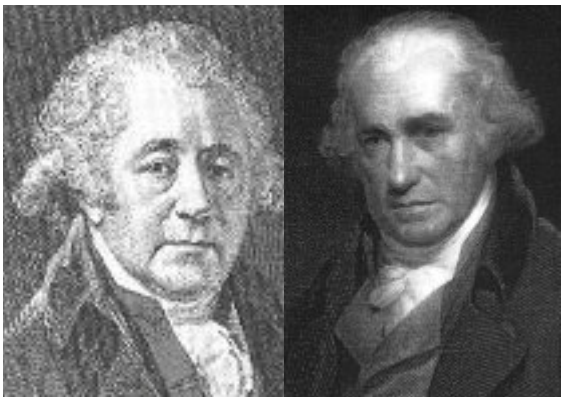


# JAMES WATT

JAMES WATT

## 1774

Matthew Boulton and James Watt entered into one of the more important partnerships of the Industrial Revolution. After persuading the Parliament to extend the patent monopoly, they had their condensing steam engine operational within two years. With a secure monopoly, the Watt engines would become renowned throughout the world.

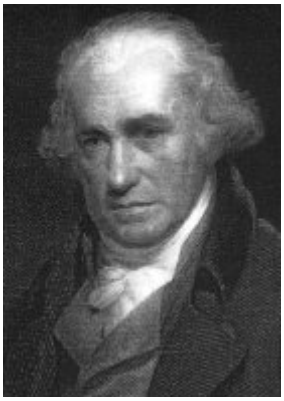


# JAMES WATT

JAMES WATT

## 1776

Until 1781 James Watt would be supervising the installation of reciprocating engines for pumping out copper and tin mines in Cornwall.



# JAMES WATT

JAMES WATT

## 1777

William Murdock entered the engineering firm of Matthew Boulton and James Watt in their Soho works at Birmingham.

# JAMES WATT

JAMES WATT

## 1779

James Watt had spent much time in Cornwall persuading mine owners to buy his Boulton & Watt design of steam engines to drive pumping equipment in tin mines. Due to ill health, he withdrew from Cornwall and despatched William Murdock as his local representative at Redruth in Cornwall to superintend the fitting of Watts steam engines. Murdock would live in Cornwall for 19 years, 16 of which would be in a cottage at Cross Street, Redruth — which today bears a plaque to that effect. He would marry Ann Paynter, the daughter of a Cornish mine overseer, and they would have two sons, William and John. It would be at his cottage in Redruth that he would experiment in distilling coal.

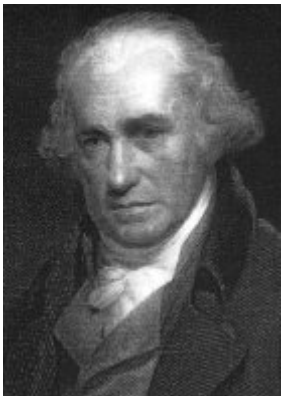
# 1780

Concord's revolutionary Committee of Correspondence, Inspection and Safety was renewed.

> The committee of correspondence, etc., chosen March, 1776 [for Concord], were John Cuming, Esq., Ephraim Wood, Jr., Esq., Capt. Jonas Heywood, Capt. Joseph Hosmer, James Barrett, Esq., Capt. David Brown, and Capt. George Minot. In 1777, Colonel John Buttrick, Josiah Merriam, Isaac Hubbard, Capt. Abishai Brown, Capt. David Wheeler, Mr. Ephraim Potter, and Lieut. Nathan Stow. In 1778, John Cuming, Esq., Colonel John Buttrick, Ephraim Wood, Jr., Esq., Jonas Heywood, Esq., James Barrett, Esq., Capt. David Brown, and Mr. Josiah Merriam. These were re-elected in 1779, 1780, 1781 & 1782. In 1783, James Barrett, Esq., Jonas Heywood, Esq., Ephraim Wood, Jr., Esq., Capt. David Wood, and Lieut. Joseph Hayward. This committee was not chosen afterwards.[4]

A news item relating to the development of ELECTRIC WALDEN technology:

- Before the first documented use of the term "carbonated paper," when Ralph Wedgwood would obtain an English patent for a "Stylographic Writer" in 1806, and before Cyrus P. Dakin of Concord's alleged invention of carbon paper in Concord in 1823 (actually we have no record of such a person ever having resided in the vicinity), the best that anyone was able to achieve by way of automatic copying was a scheme by James Watt dating to this year, for writing with a special ink containing gum arabic. By pressing his freshly written sheet of paper firmly against a sheet of wet paper the inventor of components for the steam engine found that he was able to create a copy of his writing that would remain legible for about 24 hours — but you needed to look at it with a mirror. (Watt's copying method would develop in the direction of the business letter-copying book which would have become standard procedure in business by the 1870s; Watt would also pioneer a device for the creation of pretty-good copies of sculpture.)



CARBON PAPER

4. Lemuel Shattuck's 1835 A HISTORY OF THE TOWN OF CONCORD;... Boston: Russell, Odiorne, and Company; Concord MA: John Stacy
(On or about November 11, 1837 Henry Thoreau would indicate a familiarity with the contents of at least pages 2-3 and 6-9 of this historical study.)


JAMES WATT

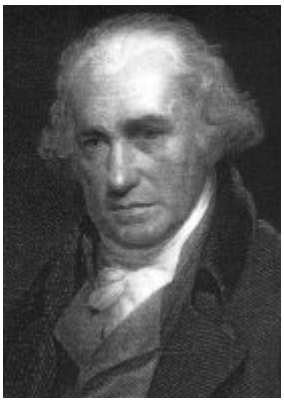
JAMES WATT

# JAMES WATT

JAMES WATT

## 1781

James Watt invented the sun-and-planet gear system which adapted the reciprocating engine for rotary motion, and produced two shaft revolutions for each stroke of the steam engine. A rotary-motion steam engine: would such a device make the use of human muscles unnecessary, and thus — would it be the end of human slavery?



Whereas that earlier machine, with its up-and-down pumping action, had been ideal for draining mines, this new rotary-motion engine could be used to drive many different types of machinery. Richard Arkwright would be quick to grasp the importance of this new invention, and in 1783 he would begin using Watt's steam-engine in his textile factories. Others would follow his lead and by 1800 there were over 500 of Watt's machines in Britain's mines and factories.

Unfortunately, there were still a few things that an enslaved human being could do that a rotating machine could not. At the age of about 14, under the name "Telemaque" which he had been assigned by his owner Joseph Vesey, Denmark Vesey was sold and put to work on a Haitian plantation chopping sugar cane. (Don't think loyalty here, think: "What, was this pretty black boy becoming overage for his skipper's rancid inclinations?") However, evidently by faking epilepsy, Telemaque got out of spending the rest of his life chopping cane through his new owner taking him back to Captain Vesey and asking for his purchase money back. (Fair dealing and good faith were things much insisted upon among white slavetraders.)

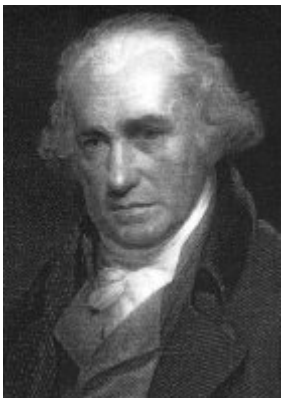
Thus it was that Telemaque arrived in this year in the port of Charleston in our Land Of The Free And The Home Of The Brave for the 1st time, aboard Captain Vesey's slaver trading ship. This port of Charleston was mainland North America's largest slave port.

# JAMES WATT

JAMES WATT

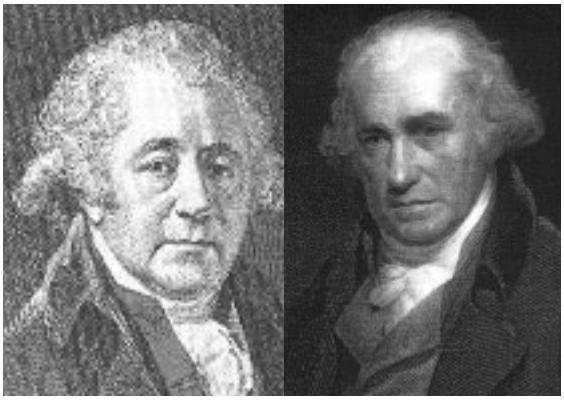
## 1782

James Watt patented a double-acting rotary steam engine, in which the piston pulls as well as pushes. But this sort of engine would require a new method of making a rigid connection between the piston and the beam, and the inventor hadn't figured this out yet, wouldn't in fact figure this out until 1784.



# 1783

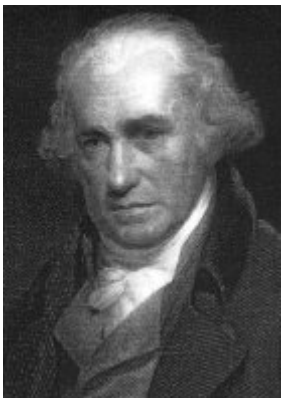
A Swiss chemist, Genevois Aimé Argand, presented George III with a lamp. (Shouldn't he have offered the man something he needed, like a last name?) The king introduced him to somebody who introduced him to somebody who introduced him to Matthew Boulton, who happened to be the partner of James Watt, and the lamp was patented and a factory was set up. The key improvement in this lamp design, the Argand lamp, was an even and adequate supply of air to the flame — but sometimes it's little things like that which make all the difference.



Although the Reverend Pierre Étienne Louis Dumont's name was not on the list of those proscribed by Geneva's aristocratic party, he chose to follow the example of his townsman Pierre Lefort, the first tutor, minister, and general of the tsar. He departed from Geneva, joining his mother and sisters at St Petersburg, Russia, where his father had formerly been court jeweller. There he would become, for a period of 18 months, the pastor of the French Reformed church.

# 1784

James Watt invented an arrangement of connecting rods that guided the piston rod of a steam engine in a perpendicular motion and produced parallel motion, thus rendering his 1782 double-acting rotary steam engine an effective design.



As of 1765 all spinning to produce cotton muslin had been by hand. However, during the 1770s in England, Richard Arkwright's spinning machine and James Hargreaves's jenny had transformed this situation and at this point all spinning was by machine, while the production of cotton cloth had increased by a multiplier of 24.[5]

By 1812 the cost of producing a pound of cotton thread would have declined by one order of magnitude and, by the early 1860s, by two orders of magnitude: 100 times less labor intensive![6]

At the age of 30, William Murdock built and tested the first primitive locomotive, a model 19 inches long by 14 inches high. He ran the steam engine automobile on a dark night along an unfrequented lane near Redruth Parish Church, scaring the "daylights" out of the local rector. However he was never able to pursue his ideas due to the obstinacy of his employers. He tackled them with a view to getting his ideas adopted as a full. size B & W production model, but was strongly turned down. Not only did they oppose his idea completely, but extracted a promise from him that he should abandon it entirely. It was therefore left to Richard Trevithick, who was a lad of 13 years at the time, to pursue the idea of a self propelled vehicle. There is evidence that Trevithick was a visitor to the Murdock house, although Trevithick's engine was of a completely different design. Murdock nevertheless kept the engine until his death, when it passed to his son John, who later sold it to Mr. Tangye of Birmingham — it now is owned by Birmingham City Council.

5. Bear in mind that in early periods the Southern states of the United States of America produced no significant amount of cotton fiber for export — such production not beginning until 1789. In fact, according to page 92 of Seybert's STATISTICS, in 1784 a small parcel of cotton that had found its way from the US to Liverpool had been refused admission to England, because it was the customs agent's opinion that this involved some sort of subterfuge: it could not have originated in the United States.

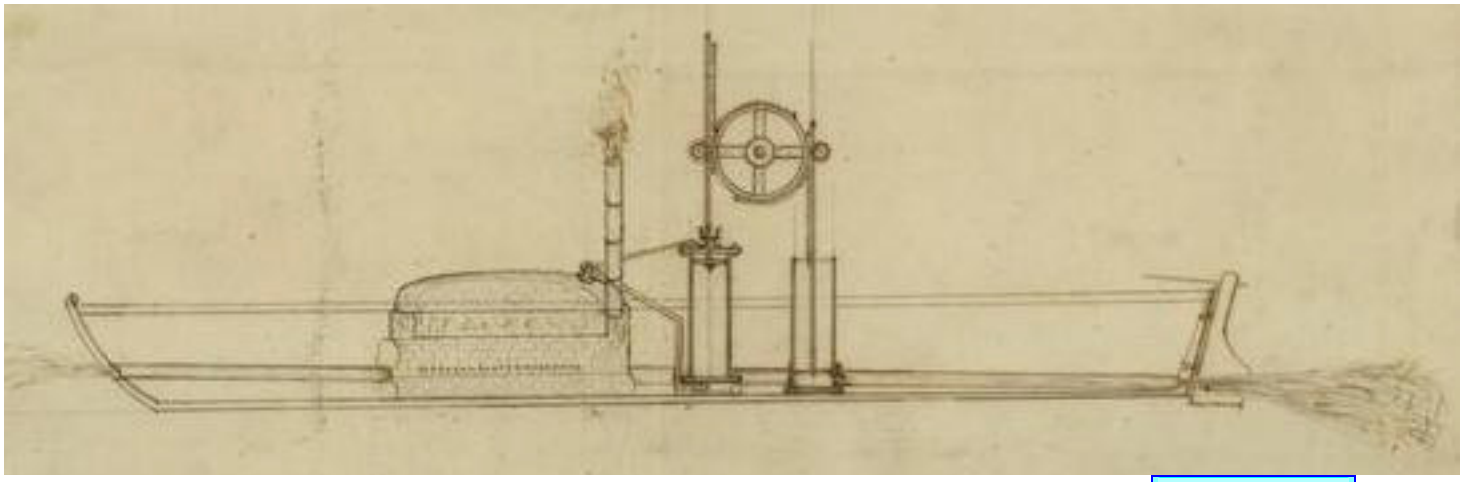
6. The mills at Fall River, Rhode Island would prove to possess a number of advantages over other towns engaged in the weaving business. Cargo vessels did not need to venture into the treacherous waters around Cape Cod in order to get there, and in those years before the digging of the Cape Cod Canal that was of considerable importance as the cost for coal and the cost for cotton could be lower there than in a port such as Boston for which the vessels had to push our into the treacherous weather and waters off the Cape. And, of course, the constant streams of immigrant labor (the textile industry was the absolute bottom rung of the ladder for white laborers, with turnovers of "operatives" averaging 5% per week due to the unrelentingly low wages) were accessible there as well as in venues such as Lowell. However, primarily, the advantage of Fall River was in its "weaving weather," which is to say, its soft and misty air, in which the relative humidity averages out at 74%. Such moist air keeps down static electricity, and thus allows a higher thread tension on the looms, while promoting an even drying of the printed fabrics. Mills located in such a climate can specialize in the finer grades of light printed fabric, which sell at the highest premium.


JAMES WATT

JAMES WATT

# 1785

John Fitch, trudging along a dusty road near Neshamini in Bucks County in Pennsylvania, was being passed by a horse and buggy when an apparition came before his mind's eye: he was rolling merrily along this road in his own buggy, and yet there was no horse in front of him, nothing but open road in front of his buggy! If a sufficiently inventive man could only figure out a way to propel his buggy by "the force procured by Steam," he could dispense with that animal and all its bother! Alas, John's dream would have to wait, for he soon recognized that he would need to design such a buggy not only to roll along a smooth flat roadbed such as this one but also to negotiate hills, etc. Damn! Well, but on a river there are no hills, why not first learn to harness "the force procured by Steam" to drive a boat, solving the propulsion problem alone, and then later he could turn to the more elaborate problem of a land vehicle! Thus Fitch determined he would first begin to work out a design for a steam-powered boat. Assuming he would have to begin with an engine of the Newcomen stationary variety, he had the idea of making the design mobile by replacing the weights which lowered the pistons in each of the two cylinders of this engine with springs. He also schemed to convert the reciprocal motion of the pistons into the rotary motion which he needed by the use of ratchets. Before he was able to try out this design, he learned of improvements in steam engines which had been made by James Watt[7] and rearranged his design. Fitch's plan to connect his steam engine with the water was to have a kind of tank-tread with paddles along each side of the boat –if you can imagine this– and there is still in existence a model of his initial scheme.



STEAMBOATS

An invention important to the development of the cloth industry occurred during this year. Edmund Cartwright developed a power-loom. At a factory in Papplewich, Nottinghamshire, England, a Boulton & Watt steam engine created through the partnership of Watt with Matthew Boulton began to power the cotton spinning machinery, whereas previously such machinery had been powered either by water power or by laborers (usually convicts) stepping upward on a treadmill.[8]

7. Watt was at this point exceedingly well known and rewarded and was, indeed, being elected to the Royal Society of London. In Waldo Emerson's "Notes" to his essay "The Conduct of Life" we find a (presumably false) attestation that:

> It was Watt who told King George III that he dealt in an article of which kings were said to be fond — Power.

Onerous labor would be shifting from the backs of local prison convicts — to the backs of remote plantation slaves. Because this development would have an impact on the demand for bales of cotton as a raw material for cloth, it would have an impact on the demand for field labor to grow this cotton, and therefore would have consequences in terms of human slavery — and in terms of the international slave trade.

> W.E. Burghardt Du Bois: The history of slavery and the slave-trade after 1820 must be read in the light of the industrial revolution through which the civilized world passed in the first half of the nineteenth century. Between the years 1775 and 1825 occurred economic events and changes of the highest importance and widest influence. Though all branches of industry felt the impulse of this new industrial life, yet, "if we consider single industries, cotton manufacture has, during the nineteenth century, made the most magnificent and gigantic advances."[9] This fact is easily explained by the remarkable series of inventions that revolutionized this industry between 1738 and 1830, including Arkwright's, Watt's, Compton's, and Cartwright's epoch-making contrivances.[10] The effect which these inventions had on the manufacture of cotton goods is best illustrated by the fact that in England, the chief cotton market of the world, the consumption of raw cotton rose steadily from 13,000 bales in 1781, to 572,000 in 1820, to 871,000 in 1830, and to 3,366,000 in 1860.[11] Very early, therefore, came the query whence the supply of raw cotton was to come. Tentative experiments on the rich, broad fields of the Southern United States, together with the indispensable invention of Whitney's cotton-gin, soon answered this question: a new economic future was opened up to this land, and immediately the whole South began to extend its cotton culture, and more and more to throw its whole energy into this one staple.
>
> Here it was that the fatal mistake of compromising with slavery in the beginning, and of the policy of *laissez-faire* pursued thereafter, became painfully manifest; for, instead now of a healthy, normal, economic development along proper industrial lines, we have the abnormal and fatal rise of a slave-labor large

8. Bear in mind that in early periods the Southern states of the United States of America produced no significant amount of cotton fiber for export — such production not beginning until 1789. In fact, according to page 92 of Seybert's STATISTICS, in 1784 a small parcel of cotton that had found its way from the US to Liverpool had been refused admission to England, because it was the customs agent's opinion that this involved some sort of subterfuge: it could not have originated in the United States.
9. Beer, *GESCHICHTE DES WELTHANDELS IM 19TEN JAHRHUNDERT*, II. 67.
10. A list of these inventions most graphically illustrates this advance: —
1738, John Jay, fly-shuttle. John Wyatt, spinning by rollers.
1748, Lewis Paul, carding-machine.
1760, Robert Kay, drop-box.
1769, Richard Arkwright, water-frame and throstle. James Watt, steam-engine.
1772, James Lees, improvements on carding-machine.
1775, Richard Arkwright, series of combinations.
1779, Samuel Compton, mule.
1785, Edmund Cartwright, power-loom.
1803-4, Radcliffe and Johnson, dressing-machine.
1817, Roberts, fly-frame.
1818, William Eaton, self-acting frame.
1825-30, Roberts, improvements on mule.
Cf. Baines, HISTORY OF THE COTTON MANUFACTURE, pages 116-231; *ENCYCLOPÆDIA BRITANNICA*, 9th ed., article "Cotton."
11. Baines, HISTORY OF THE COTTON MANUFACTURE, page 215. A bale weighed from 375 lbs. to 400 lbs.

farming system, which, before it was realized, had so intertwined itself with and braced itself upon the economic forces of an industrial age, that a vast and terrible civil war was necessary to displace it. The tendencies to a patriarchal serfdom, recognizable in the age of Washington and Jefferson, began slowly but surely to disappear; and in the second quarter of the century Southern slavery was irresistibly changing from a family institution to an industrial system.

The development of Southern slavery has heretofore been viewed so exclusively from the ethical and social standpoint that we are apt to forget its close and indissoluble connection with the world's cotton market. Beginning with 1820, a little after the close of the Napoleonic wars, when the industry of cotton manufacture had begun its modern development and the South had definitely assumed her position as chief producer of raw cotton, we find the average price of cotton per pound, 8½*d.* From this time until 1845 the price steadily fell, until in the latter year it reached 4*d.*; the only exception to this fall was in the years 1832-1839, when, among other things, a strong increase in the English demand, together with an attempt of the young slave power to "corner" the market, sent the price up as high as 11*d.* The demand for cotton goods soon outran a crop which McCullough had pronounced "prodigious," and after 1845 the price started on a steady rise, which, except for the checks suffered during the continental revolutions and the Crimean War, continued until 1860.[12] The steady increase in the production of cotton explains the fall in price down to 1845. In 1822 the crop was a half-million bales; in 1831, a million; in 1838, a million and a half; and in 1840-1843, two million. By this time the world's consumption of cotton goods began to increase so rapidly that, in spite of the increase in Southern crops, the price kept rising. Three million bales were gathered in 1852, three and a half million in 1856, and the remarkable crop of five million bales in 1860.[13]

Here we have data to explain largely the economic development of the South. By 1822 the large-plantation slave system had gained footing; in 1838-1839 it was able to show its power in the cotton "corner;" by the end of the next decade it had not only gained a solid economic foundation, but it had built a closed oligarchy with a political policy. The changes in price during the next few years drove out of competition many survivors of the small-farming free-labor system, and put the slave *régime* in position to dictate the policy of the nation. The zenith of the system and the first inevitable signs of decay came in the years 1850-1860, when the rising price of cotton threw the whole economic energy of the South into its cultivation, leading to a terrible consumption of soil and slaves, to a great increase in the size of plantations, and to increasing power and effrontery on the part of the slave barons. Finally, when a rising moral crusade conjoined with threatened economic disaster, the oligarchy, encouraged by the state of the

12. The prices cited are from Newmarch and Tooke, and refer to the London market. The average price in 1855-60 was about 7*d.*

13. From United States census reports.

cotton market, risked all on a political *coup-d'état*, which failed in the war of 1861-1865.[14]

14. Cf. United States census reports; and Olmsted, THE COTTON KINGDOM.

# 1786

The Reverend Joseph Priestley's HISTORY OF EARLY OPINIONS CONCERNING JESUS CHRIST developed his ideas on Unitarianism. King George III and many other Englishmen were convinced that Priestley had gone atheist. Priestley moved to Birmingham where he became friends with businessmen and scientists such as John Wilkinson, Josiah Wedgewood, Matthew Boulton, and James Watt. Whereas Priestley's scientific work, for example, his discovery of oxygen, was welcomed, his religious and political views were constantly getting him into trouble. The Reverend and his friend Richard Price became leaders of a group of men known as the Rational Dissenters.

> I consider my settlement at Birmingham as the happiest event of my life.
>
> THE LUNAR SOCIETY OF BIRMINGHAM

As the congregation at the Stone Chapel in Boston wished to remain connected with the Episcopal Church, in this year they sent a request to Bishop Samuel Seabury to have the Reverend James Freeman ordained as their rector. Because of the controversy surrounding the changes that had been made to the chapel's liturgy, Bishop Seabury replied that he would require the recommendation of his presbyters. After interviewing the Reverend Freeman and confirming that he did not subscribe to the Trinity, the presbyters denied his application for ordination. A more liberal-minded clergyman, Dr. Samuel Provoost, bishop-elect of New-York, also declined his support — but all this meant was that the determined wardens of the chapel would need to take it upon themselves to arrange a **lay** ordination.

# JAMES WATT

JAMES WATT

## 1788

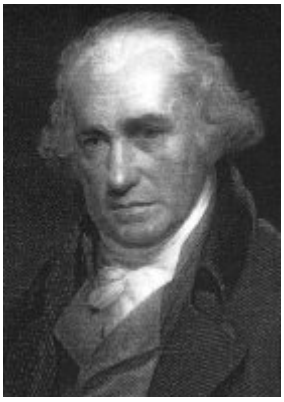
James Watt invented a centrifugal governor for automatic control of the speed of his engine.

# JAMES WATT

JAMES WATT

## 1790

James Watt invented the pressure gauge.



# 1791

July 14, Thursday: Demonstrations and commemorations take place in Dublin, Belfast and elsewhere in Ireland on the second anniversary of the fall of the Bastille.

With no prospect of any income, Niccolo Piccinni departed from Paris with his wife and daughters, for their home in Naples (in an age of revolution, his operas had become passe).

Hostility toward the Reverend Joseph Priestley had increased when he wrote a pamphlet defending the French Revolution, that was expanded into A POLITICAL DIALOGUE ON THE GENERAL PRINCIPLES OF GOVERNMENT. In the book he had expressed political ideas similar to those of Tom Paine in RIGHTS OF MAN. He had expressed a hope the events in France might increase the chances of "universal peace and goodwill among all nations," by making possible what he termed an "empire of reason." His prediction that the French Revolution heralded a change in the role of the monarchy had badly upset King George III. The powers that be in England knew very well that there was only appropriate topic of conversation on their tight little island, that topic being how to marry up into greater wealth and standing, all other chitchat being in the category of useless, or in the category of dangerous, or in the category of both useless and dangerous. The monarch and his sattraps were particularly offended by Priestley's view that in the future monarchs were to be merely the "first servants of the people and accountable to them."


## THE SERVANTS

When he commented about the need to put kegs of gunpowder "under the old building of error and superstition," he was assigned the nickname "Gunpowder":

> We are, as it were, laying gunpowder, grain by grain, under the old building of error and superstition, which a single spark may hereafter inflame, so as to produce an instantaneous explosion; in consequence of which that edifice, the erection of which has been the work of ages, may be overturned in a moment, and so effectually as that the same foundation can never be built upon

again.

He took part in forming a Constitutional Society in Birmingham. (What was a "Constitutional Society"? — Well, for starters, the English government ought to be more similar to the federal government of the USA!)

> I consider my settlement at Birmingham as the happiest event of my life.

Tories in the city made inflammatory speeches attacking Priestley's political ideas. Slogans such as NO PHILOSOPHERS adorned Birmingham's walls. When a dinner was held at Dadley's Hotel in Temple Row to celebrate the 2nd anniversary of the storming of the Bastille, the opportunity arose. The impoverished of the city had already been carefully primed and inflamed by the inherited-old-money richies there, for a sponsored riot against its earned-new-money richies. The Reverend Priestley, who had not even attended this the dinner, was quoted in the streets as having offered a toast "The King's Head — On A Plate!" Defend your Monarch against this philosophical insolence! On this day he was hosting a party to honor Bastille Day at his home, and the inflamed mob broke into the home and destroyed most of his papers, books, and scientific equipment. The mob of religious people also burned the homes and laboratories of other Birmingham dissenters and philosophers (scientists), such as William Withering, John Ryland, John Taylor, and George Humphry.The

father of William Hazlitt would be one of those who protested this persecution of the Reverend Priestley. The Reverend would need to abandon Birmingham for London, and would teach history and science at the New Unitarian College at Hackney near London. James Watt would comment, "The Hellish miscreants who committed so many outrages here, by banishing Dr Priestley have almost broke up our Lunar Society."

THE LUNAR SOCIETY OF BIRMINGHAM

# 1797

Matthew Boulton used modern manufacturing methods to revolutionize the quality and detail of the national coinage. Aware that the new technology would make forgery that much more difficult, the British Government placed an order for the manufacture of 45,000,000 1-ounce copper penny and 2-ounce copper twopence pieces. Further orders would follow.

Since the firm of Boulton & Watt consistently opposed William Murdock's getting any patents for his inventions, in this year he changed employers. B & W would realize their loss and after a year offer him another post in his old firm, as Manager of their Birmingham Engineering Works.

JAMES WATT

# 1802

HISTORY OF RR

James Watt powered his steam engine with the vapors released by heated coal in an enclosed space.[15]

STEAM ENGINES

It was at about at this point, too, at which Watt, working in his old age in the garrett of his home at Doldowlod, Radnorshire, invented his sculpturing machine for the reproduction of original busts and figures.

To celebrate the Peace of Amiens, Matthew Boulton installed two gas lamps outside his Soho factory, which illuminated part of the factory's exterior.Sir Humphrey Davy created an electric arc lamp. (It was crude, but it

WILLIAM MURDOCK

was an electric light.)

15.Within the next decade, the business of producing these coal vapors for "gaslight" would thrive.

# JAMES WATT

JAMES WATT

## 1803

At the plant in Soho, Birmingham, England the foundry interior was entirely illuminated by gas. Other places nearby, such as the Phillips and Lee cotton mill, began to use gas lighting. Soon afterwards Boulton & Watt began to sell lighting and heating equipment and William Murdock became a partner in the business. It would not be long before all large factories used such gas lighting.

JAMES WATT
MATTHEW BOULTON

# 1804

The *Eructor Amphibolis* or *Puffing Amphibian*, a steam dredge “To work on Land or Water” was created by Oliver Evans of Philadelphia, “the James Watt of America.” Evans had been, even before the turn of the century, successfully constructing steam engines of fairly high pressure. This steam dredge could propel itself across ground surfaces upon wheels and across still water surfaces by powered paddles (shown here as drawn by T. West):

# 1805

Oliver Evans of Philadelphia, "the James Watt of America," opened the doors of his work shed and drove his amphibious vehicle, which he termed the *Orukter Amphibolos*, a few blocks to the City Hall. After displaying the vehicle there for several days (shown here as drawn by T. West), he drove it down to the banks of the Schuylkill River, moved its drive belt from its wheels to its paddle wheel, and ventured out upon the waters. After steaming around the southern tip of Philadelphia, he steamed some 16 miles up the Delaware River against the current, before returning his vehicle to the dock and then to his work shed near the city hall. This year 1805 then would be marked as the year of the first self-propelled vehicle in America.[16]

16. Well, but this was merely the 1st such demonstration in the New World, not in the entire world. Such a demonstration had already taken place 22 years earlier, the inventor being Claude-François-Dorothée, marquis de Jouffroy d'Abbans, the vehicle the *Pyroscaphe*, and the river the Saône.

# 1819

August 25, Wednesday: James Watt died near Birmingham, England.

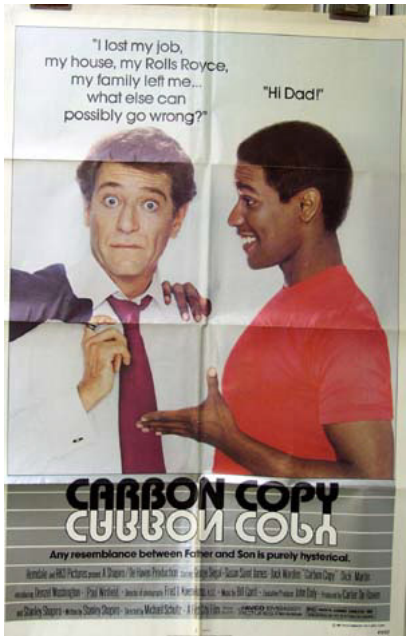
On the island of St. Helena in the south Atlantic, the battalion of St. Helena sharp-shooters who had fired upon the Chinese workmen who had been rioting among themselves near where Napoléon Bonaparte was being kept, killing some killed and wounding a good many, had their courtmartial and were uniformly found not guilty.

## THE FUTURE CAN BE EASILY PREDICTED IN RETROSPECT

# 1823

A news item relating to the development of ELECTRIC WALDEN technology:

- According to an unprovenanced tale which has appeared several times on TV, one Cyrus Dakin of Concord (there is no local record of such a person) devised a technique for automatically copying anything which was being inscribed in pencil, which he promptly began to term "carbon paper." He allegedly coated the bottom side of sheets of writing paper with paraffin wax and carbon black, or with naptha and ink, in such manner that the pressure on the paper produced by one's pencil point would create a copy of whatever one was writing on the piece of paper beneath.[17] Dakin allegedly would sell the rights to his invention to the Associated Press.




If you are able to credit such a story you will certainly enjoy the above movie!

17. Previous to this, the best that anyone had been able to achieve by way of automatic copying had been a 1780 scheme by James Watt for writing with a special ink containing gum arabic. By pressing his freshly written sheet of paper firmly against a sheet of wet paper the inventor of components for the steam engine had been able to create a copy of his writing, but you needed to look at it with a mirror, plus, Watt hadn't been able to figure out how to get this reverse copy to remain legible for longer than about 24 hours. (Watt also invented a device for the creation of copies of sculpture, which was somewhat more successful.)

# 1830

William Murdock retired from the firm of Boulton & Watt as a partner and purchased a retirement home in Cornwall at Sycamore Hill, Penzance.

JAMES WATT
MATTHEW BOULTON

## "MAGISTERIAL HISTORY" IS FANTASIZING, HISTORY IS CHRONOLOGY



"It's all now you see. Yesterday won't be over until tomorrow and tomorrow began ten thousand years ago."

– Remark by character "Garin Stevens" in William Faulkner's INTRUDER IN THE DUST

Prepared: April 11, 2014

JAMES WATT

JAMES WATT

# ARRGH AUTOMATED RESEARCH REPORT

# GENERATION HOTLINE


This stuff presumably looks to you as if it were generated by a human. Such is not the case. Instead, someone has requested that we pull it out of the hat of a pirate who has grown out of the shoulder of our pet parrot "Laura" (as above). What these chronological lists are: they are research reports compiled by ARRGH algorithms out of a database of modules which we term the Kouroo Contexture (this is data mining). To respond to such a request for information we merely push a button.

Commonly, the first output of the algorithm has obvious deficiencies and we need to go back into the modules stored in the contexture and do a minor amount of tweaking, and then we need to punch that button again and recompile the chronology — but there is nothing here that remotely resembles the ordinary "writerly" process you know and love. As the contents of this originating contexture improve, and as the programming improves, and as funding becomes available (to date no funding whatever has been needed in the creation of this facility, the entire operation being run out of pocket change) we expect a diminished need to do such tweaking and recompiling, and we fully expect to achieve a simulation of a generous and untiring robotic research librarian. Onward and upward in this brave new world.

First come first serve. There is no charge.
Place requests with <Kouroo@kouroo.info>. Arrgh.