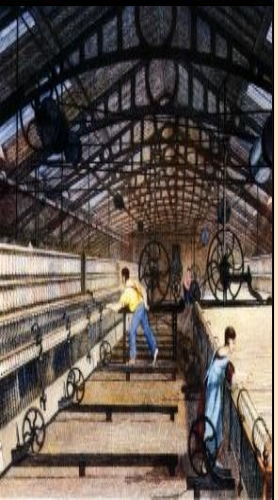
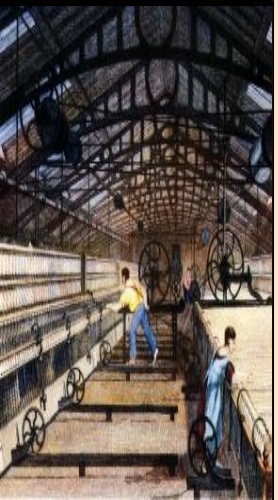
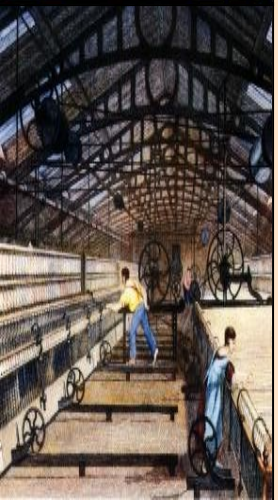


The Industrial Revolution [1760-1840]

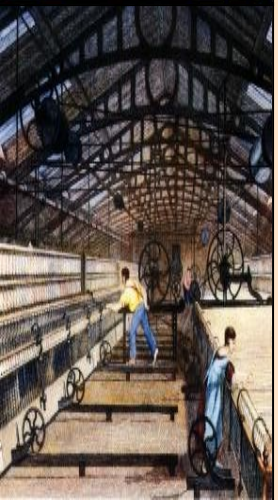


WHY DID INDUSTRIALIZATION BEGIN IN ENGLAND FIRST?



How it Began?

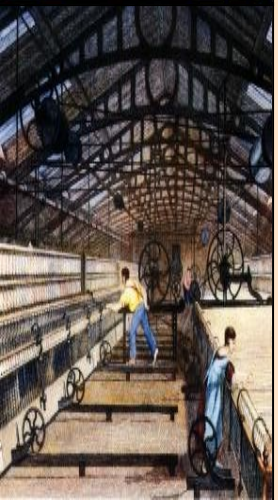
- The Continental movement and the British Agricultural Revolution made
- food production more efficient and less labor-intensive,
- encouraging the surplus population who could no longer find employment in agriculture into cottage industry, for example weaving, and in the longer term into the cities and the newly-developed factories.
- The colonial expansion of the 17th century with the accompanying development of international trade, creation of financial markets and accumulation of capital are also cited as factors.



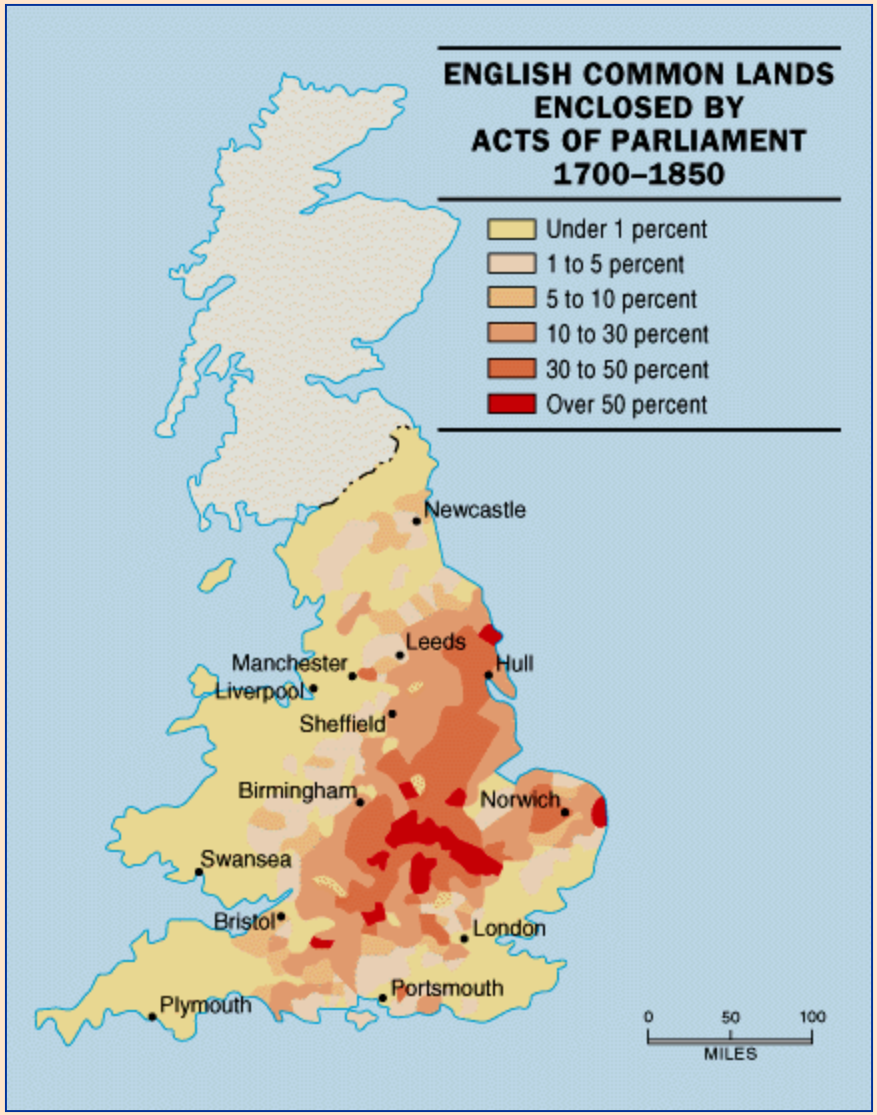
Origins

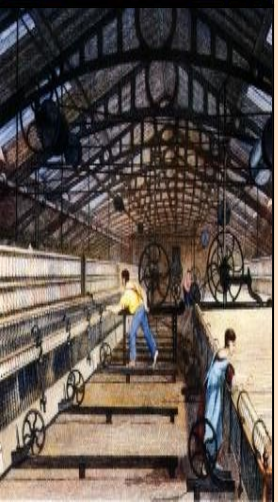
- **Agricultural revolution**
  - Horse and steel plough
  - Fertilizer use
  - Yields improved 300% 1700-1850
- **Growth of foreign trade for manufactured goods**
  - Foreign colonies
  - Increase in ships and size
- **Successful wars and foreign conquest**

NEW CAPITALS FOR INDUSTRIAL INVESTMENTS

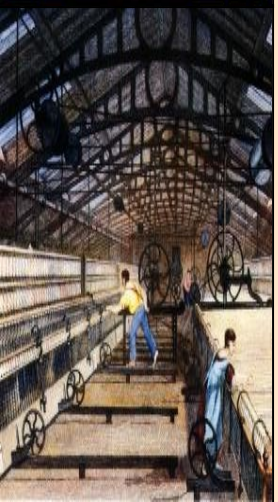


The Enclosure Movement



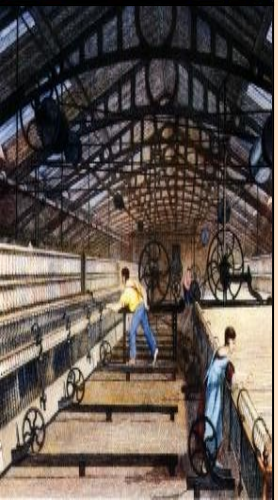


"Enclosed" Lands Today



Origins – Why England?

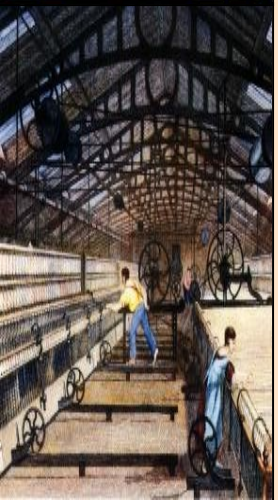
- Factors in England
  - No civil strife
  - Government favored trade
  - *Laissez faire*
  - Large middle class
  - Island geography
  - Mobile population
  - Everyone lived within 20 miles of navigable river
  - Tradition of experimental science
  - Weak guilds



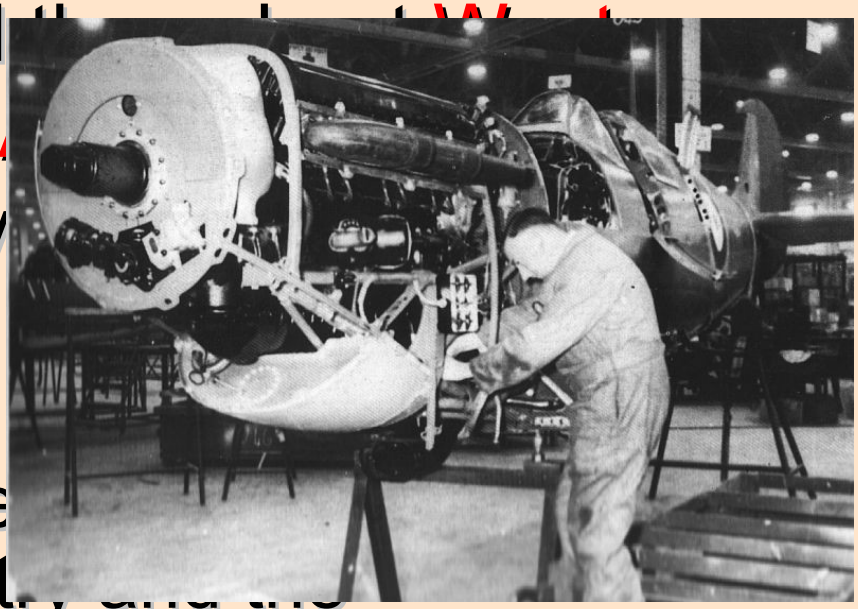
Industrial Revolution

The **Industrial revolution** was the major shift of technological, socioeconomic and cultural conditions in the late 18th and early 19th century that began in Britain and spread throughout the world.

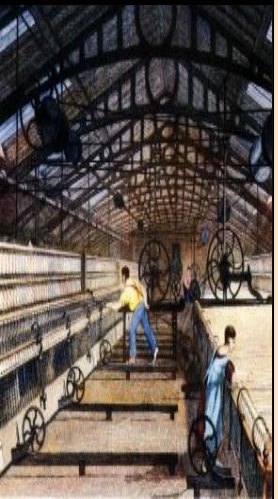
A Watt steam engine in Madrid. The development of the steam engine propelled the Industrial Revolution in Britain. The steam engine was created to pump water from coal mines, enabling them to be deepened beyond groundwater levels.



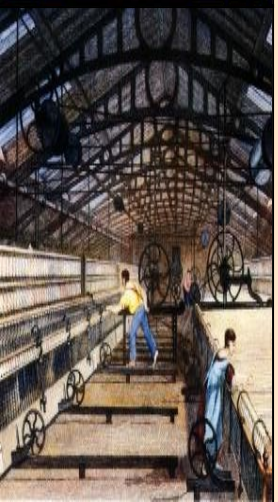
- The effects spread
  Europe and North
  century, eventually
  world.
- During that time, an
  manual labor was re
  dominated by industry and the
  manufacture of machinery.



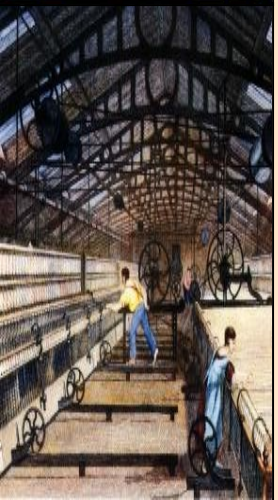
The first major techn
innovation was the c



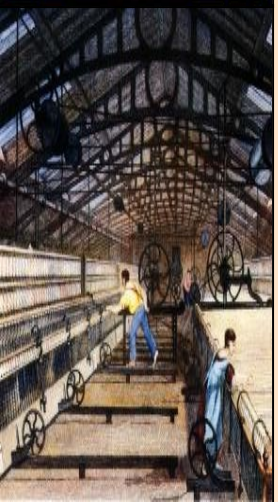
NEW INVENTIONS OF THE INDUSTRIAL REVOLUTION



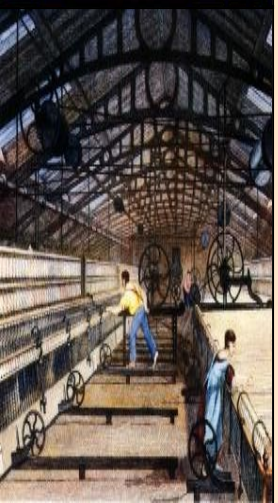
- While the spinning jenny is frequently pointed to as the first, major technological innovation of the industrial revolution, the **invention** that really drove the revolution in the eighteenth century was invented several decades earlier: **the STEAM ENGINE**.
- Along with the growth in the cotton industry, the steel industry began to grow by leaps and bounds. This was largely due to a quirk in English geography: England sits on vast quantities of coal, a carbon based mineral derived from ancient life forms.



James Watt's Steam Engine

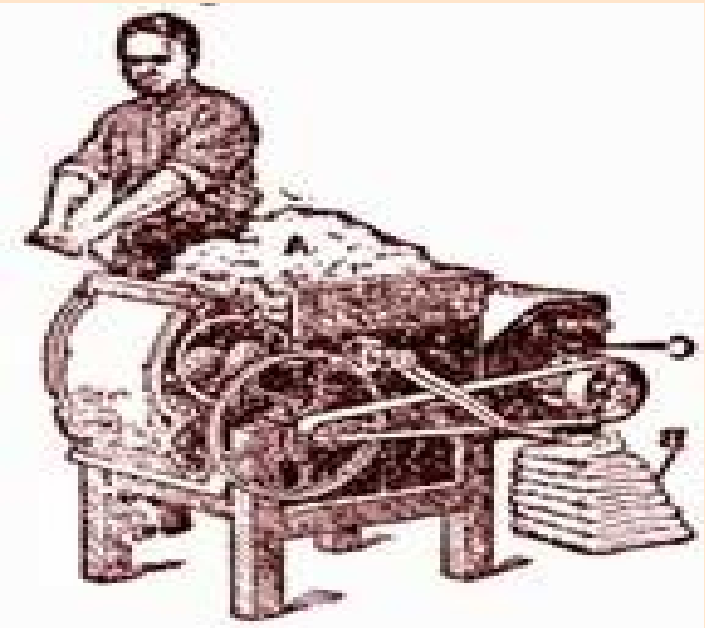


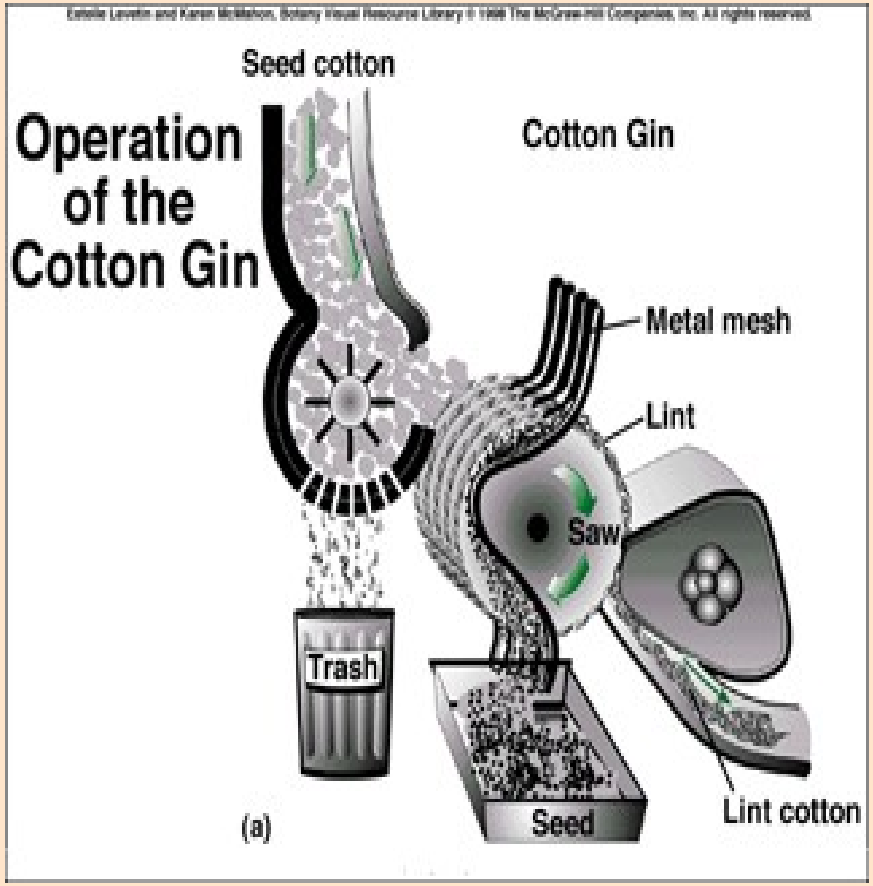
- A Scotsman named James Watt invented the machine in 1763. Patented in 1769, Watt's steam engine had the efficiency to be applied to all kinds of industries. He was not, however, good at doing business and it was only when he had teamed up with the businessman, Matthew Boulton, that the steam engine began to change the face of English manufacture. By 1800, Watt and Boulton sold 289 of these new engines; by the middle of the next century, the steam engine replaced water as the major source of motive power in England and Europe.

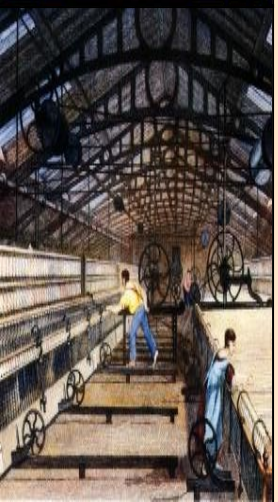


Another important technological innovation was the cotton gin

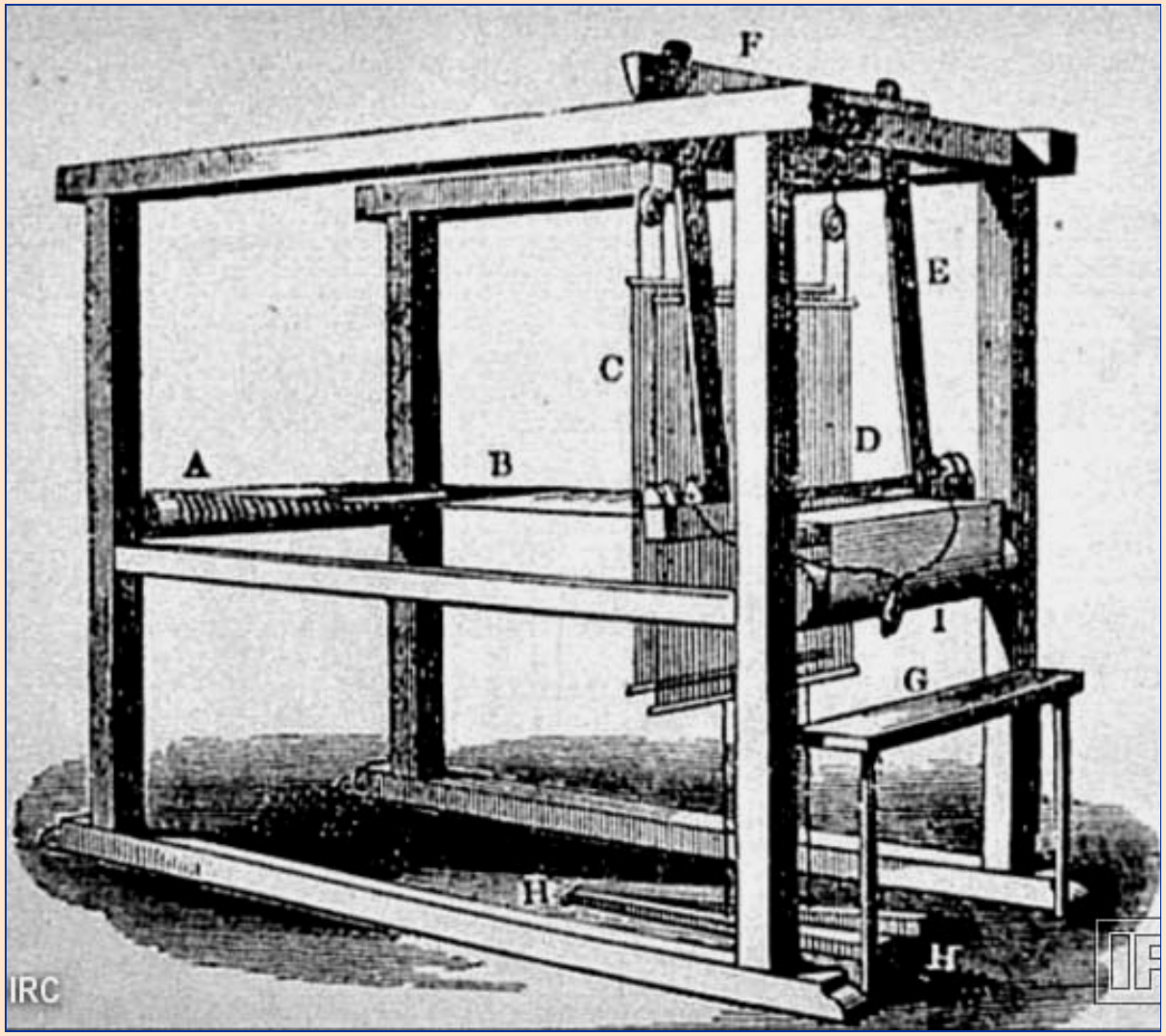
(machine that quickly and easily separates the cotton fibers from the seedpods and the sometimes sticky seeds, a job previously done by hand

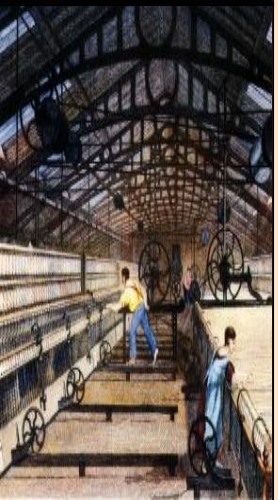






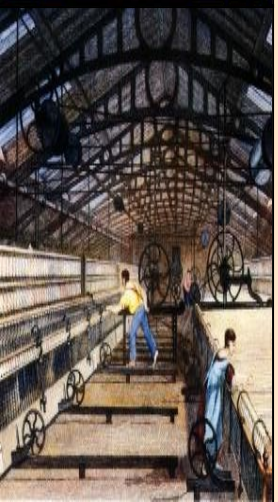
John Kay's "Flying Shuttle"



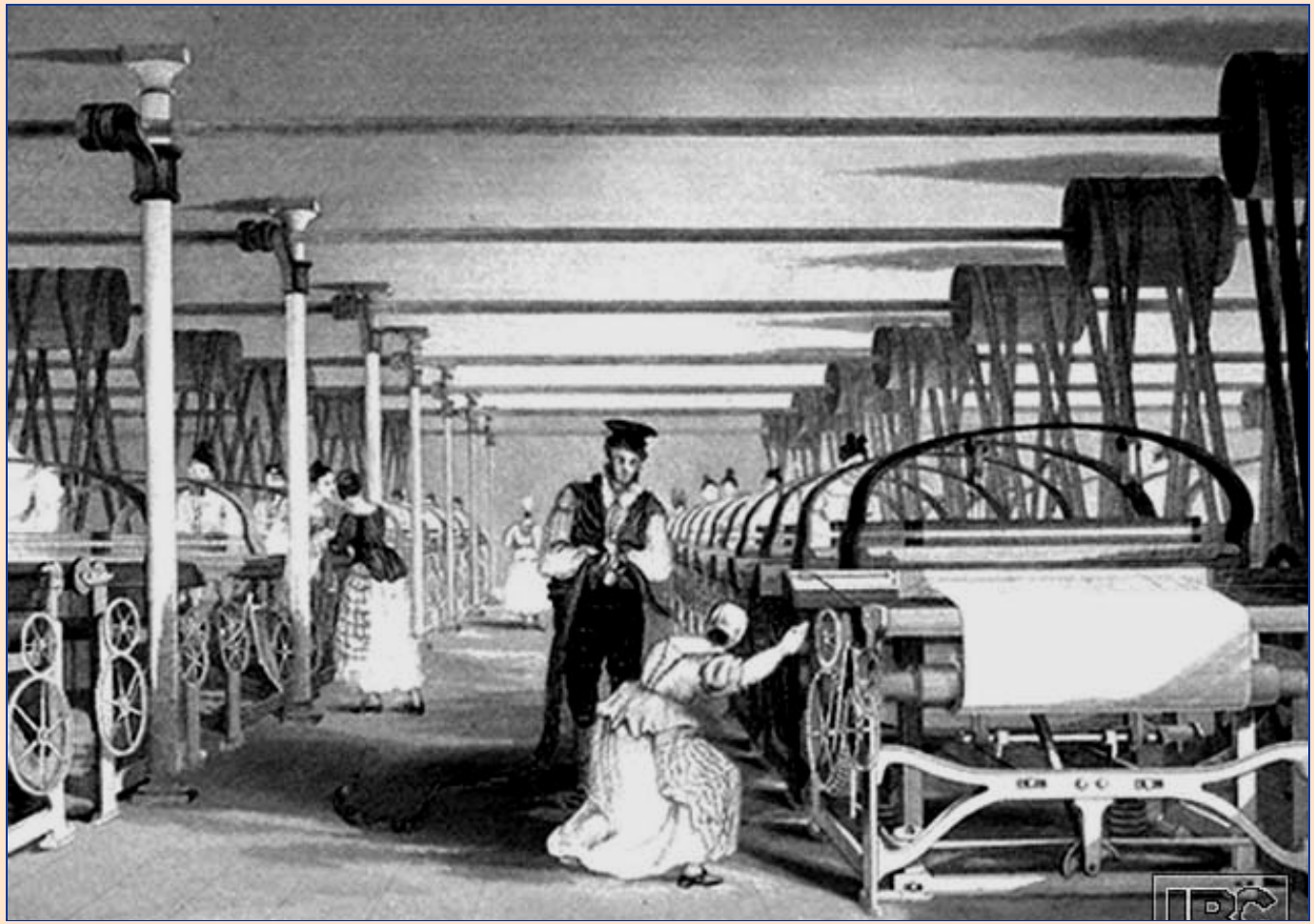


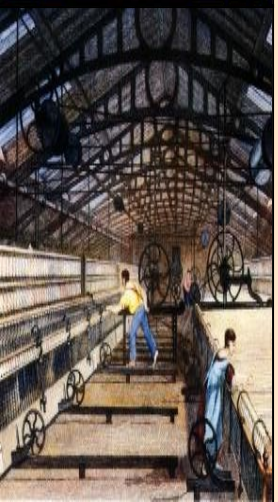
Richard Arkwright:
"Pioneer of the Factory System"

The "Water Frame"



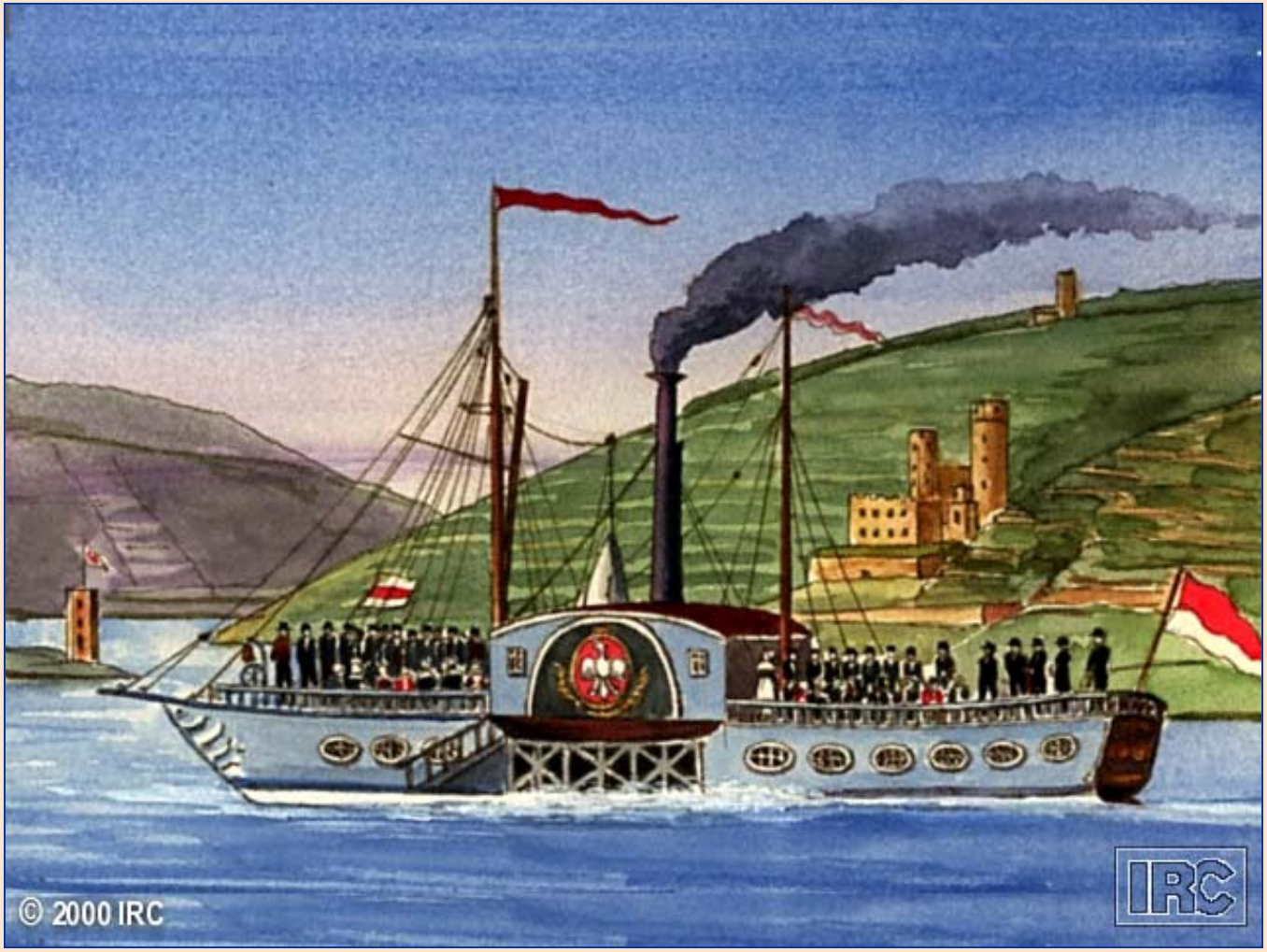
The Power Loom

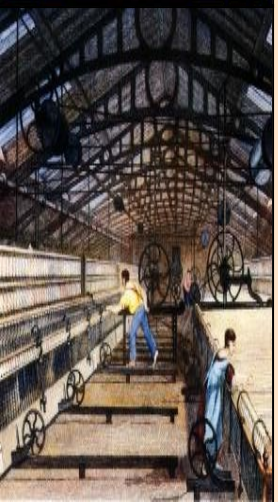




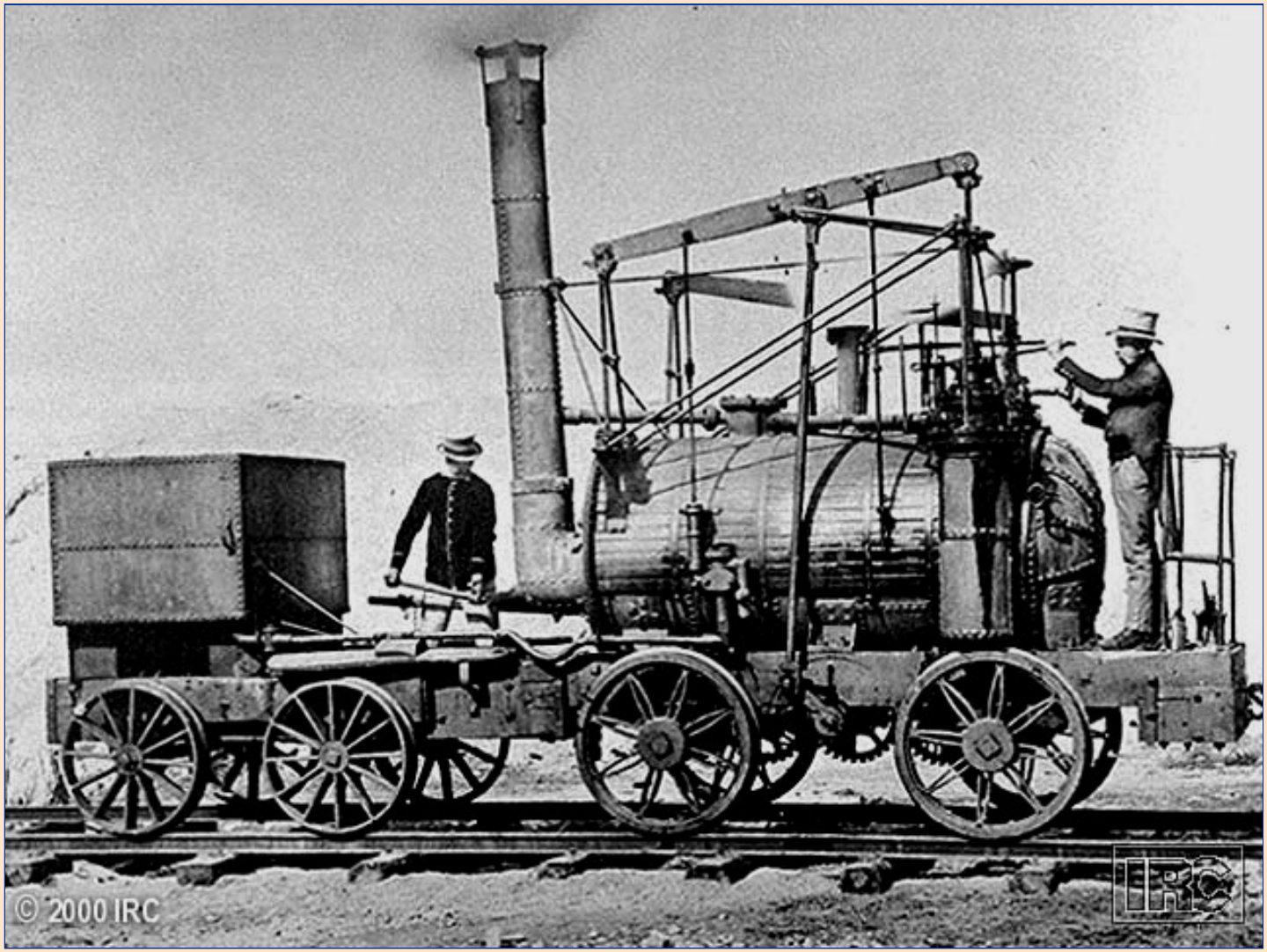
Steam Tractor

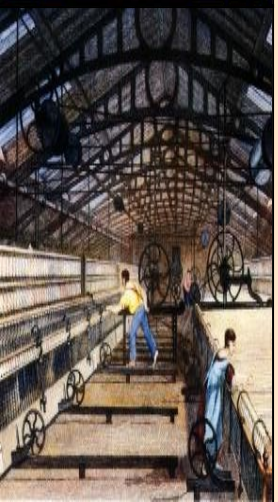
Steam Ship



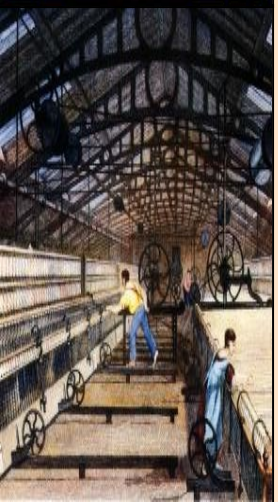


An Early Steam Locomotive

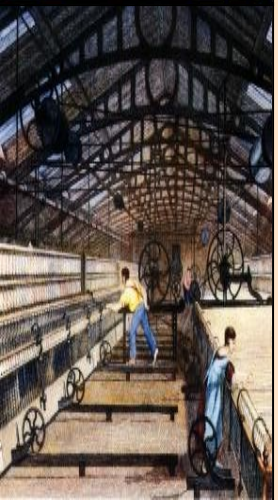




Later Locomotives

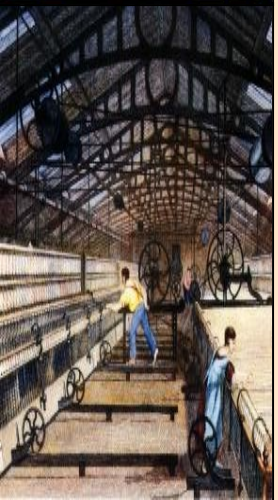


- Coal burns better and more efficiently than wood and, if you have lots of coal, its infinitely cheaper. The English figured out that they could substitute coal for wood in the melting of metals, including iron and steel.

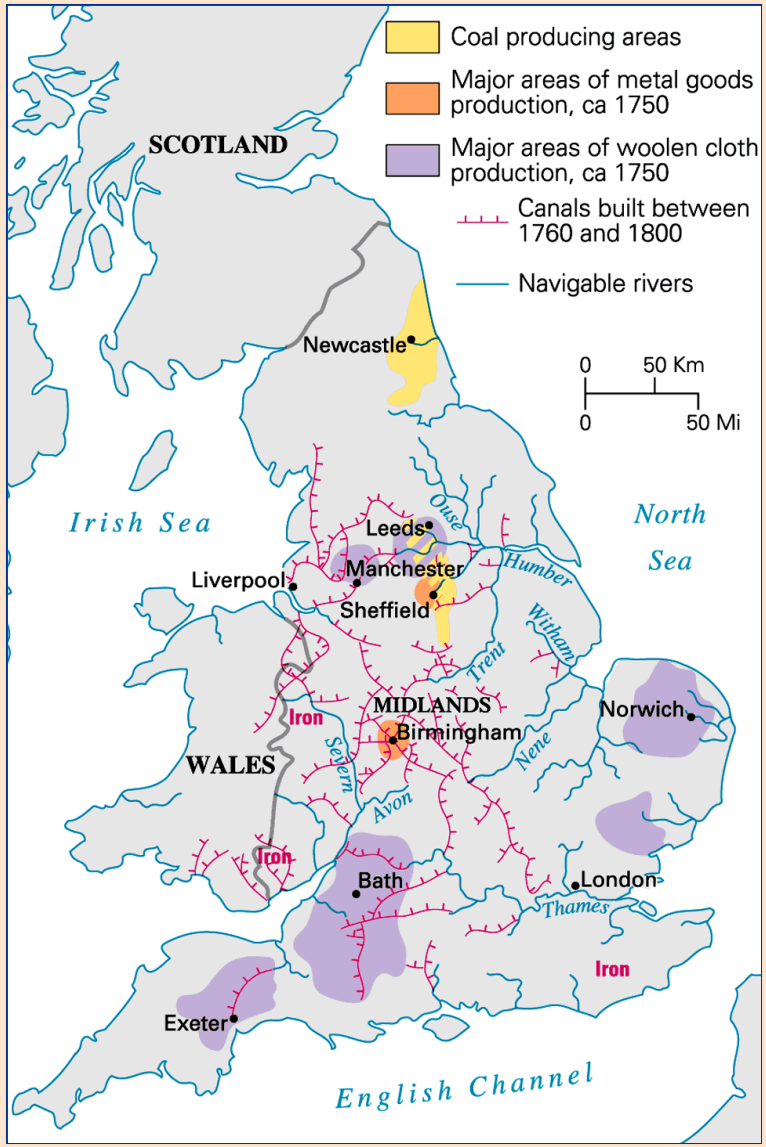


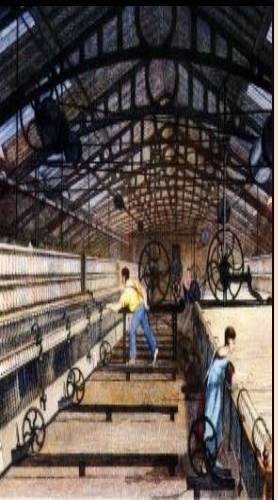
INDUSTRIAL ENGLAND: "WORKSHOP OF THE WORLD"

That Nation of Shopkeepers!
-- Napoleon Bonaparte



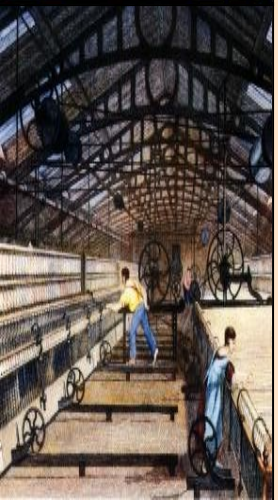
Metals, Woolens, & Canals





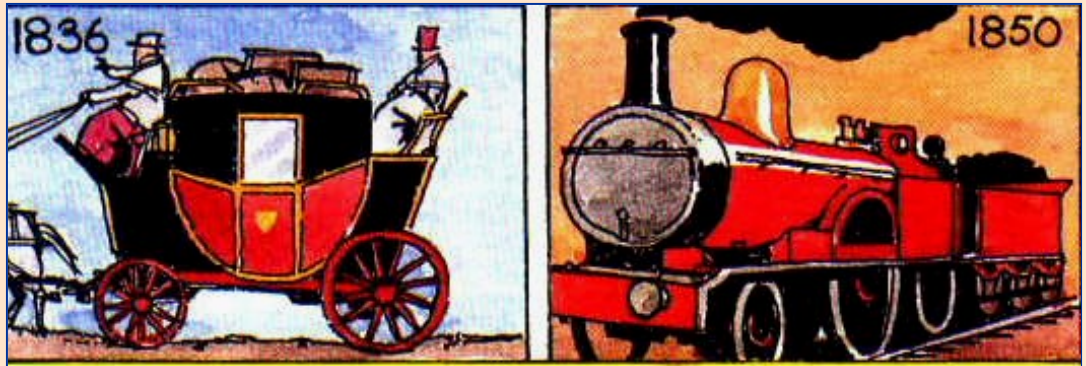
Early Canals

Canals began to be built in the late eighteenth century to <u>link the major manufacturing centres</u> in the **<u>Midlands and north</u>** with **<u>seaports and with London</u>**, at that time itself the largest manufacturing centre in the country. Canals were the first technology to allow bulk (grandi quantità) materials to be easily transported across country. *<u>Britain's canal network, together with its surviving mill buildings, is one of the most enduring features of the early Industrial Revolution to be seen in Britain.</u>*

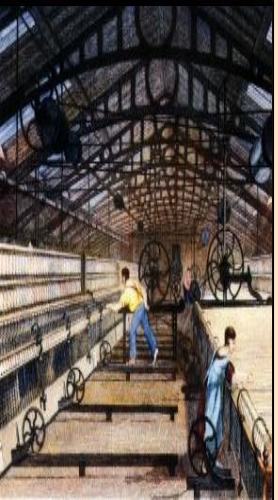


The Impact of the Railroad

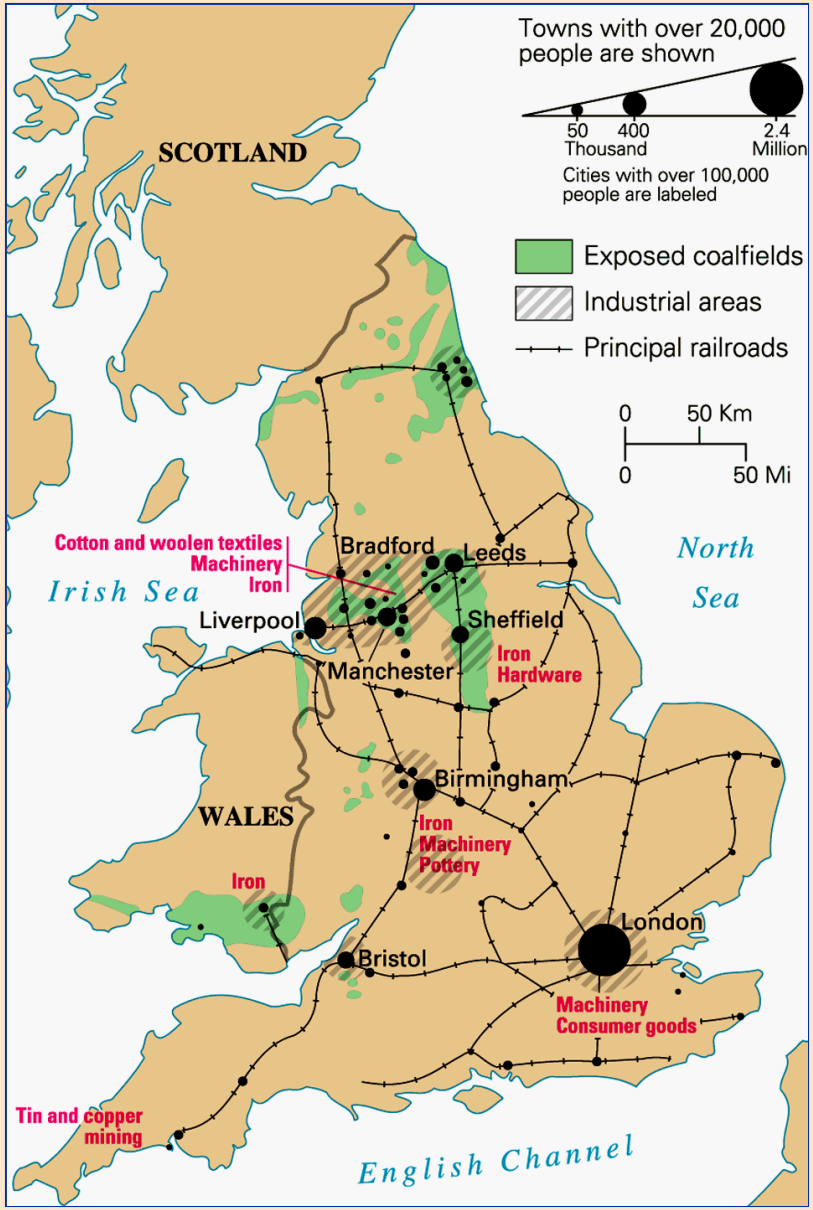
Steam-hauled public railways **began**, after the first **George Stephenson** locomotive in 1814, with the Stockton and Darlington Railway in 1825 and the Liverpool and Manchester Railway in 1830. The construction of major railways **connecting the larger cities and towns began in the 1830s** but only gained momentum at the very end of the first Industrial Revolution. Railways helped Britain's trade enormously, providing a quick and easy way of transport (fresh food, fish, newspapers could be transported rapidly and some goods could be sold while it was still fresh).

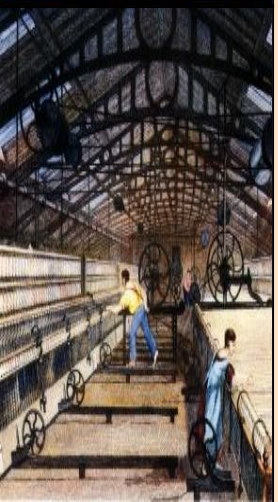


JOURNEY TIMES FROM LONDON (IN HOURS)		
43	EDINBURGH	12¼
24	LIVERPOOL	6½
18	EXETER	4¾
11	BIRMINGHAM	3
6	BRIGHTON	1¼



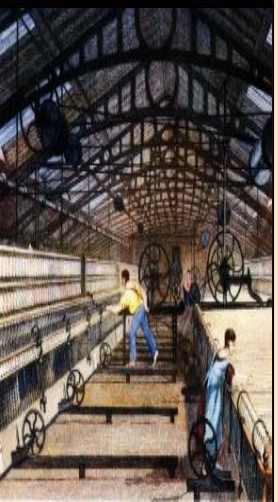
Coalfields & Industrial Areas





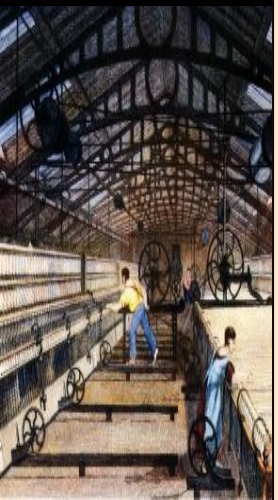
Coal Mning in Britain: 1800-1914

1800	1 ton of coal	50, 000 miners
1850	30 tons	200, 000 miners
1880	300 million tons	500, 000 miners
1914	250 million tons	1, 200, 000 miners



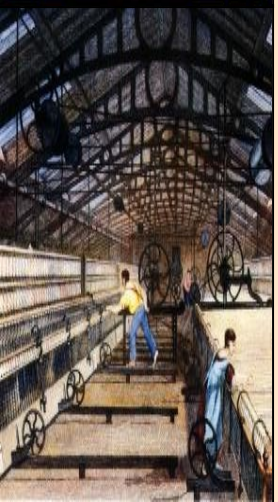
Factory Production

- Concentrates production in one place [materials, labor].
- Located near sources of power [rather than labor or markets].
- Requires a lot of capital investment [factory, machines, etc.] more than skilled labor.
- Only 10% of English industry in 1850.



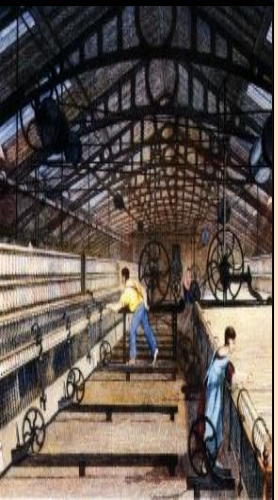
Textile Factory Workers in England

1813	2400 looms	150, 000 workers
1833	85, 000 looms	200, 000 workers
1850	224, 000 looms	>1 million workers



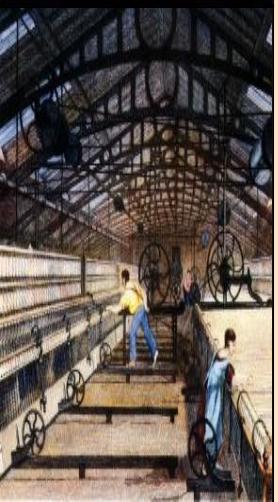
The Factory System

- Rigid schedule.
- 12-14 hour day.
- Dangerous conditions.
- Mind-numbing monotony.



Manufacturing Negatives

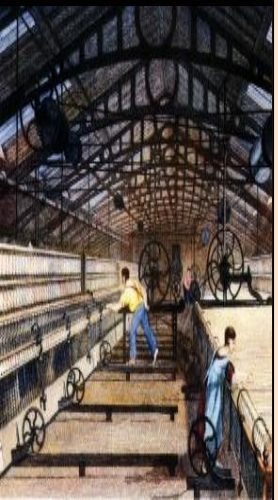
- Poor working conditions
- Children supplied labor
- Luddites
  - Handicraftsmen replaced by machine
  - Organized to stop industrialization



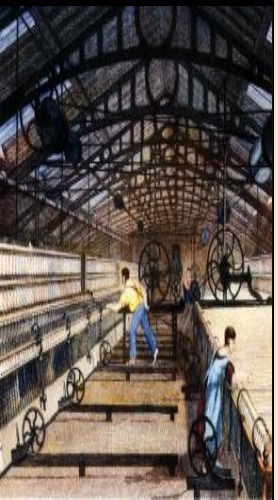
Problems of Polution

The Silent Highwayman - 1858

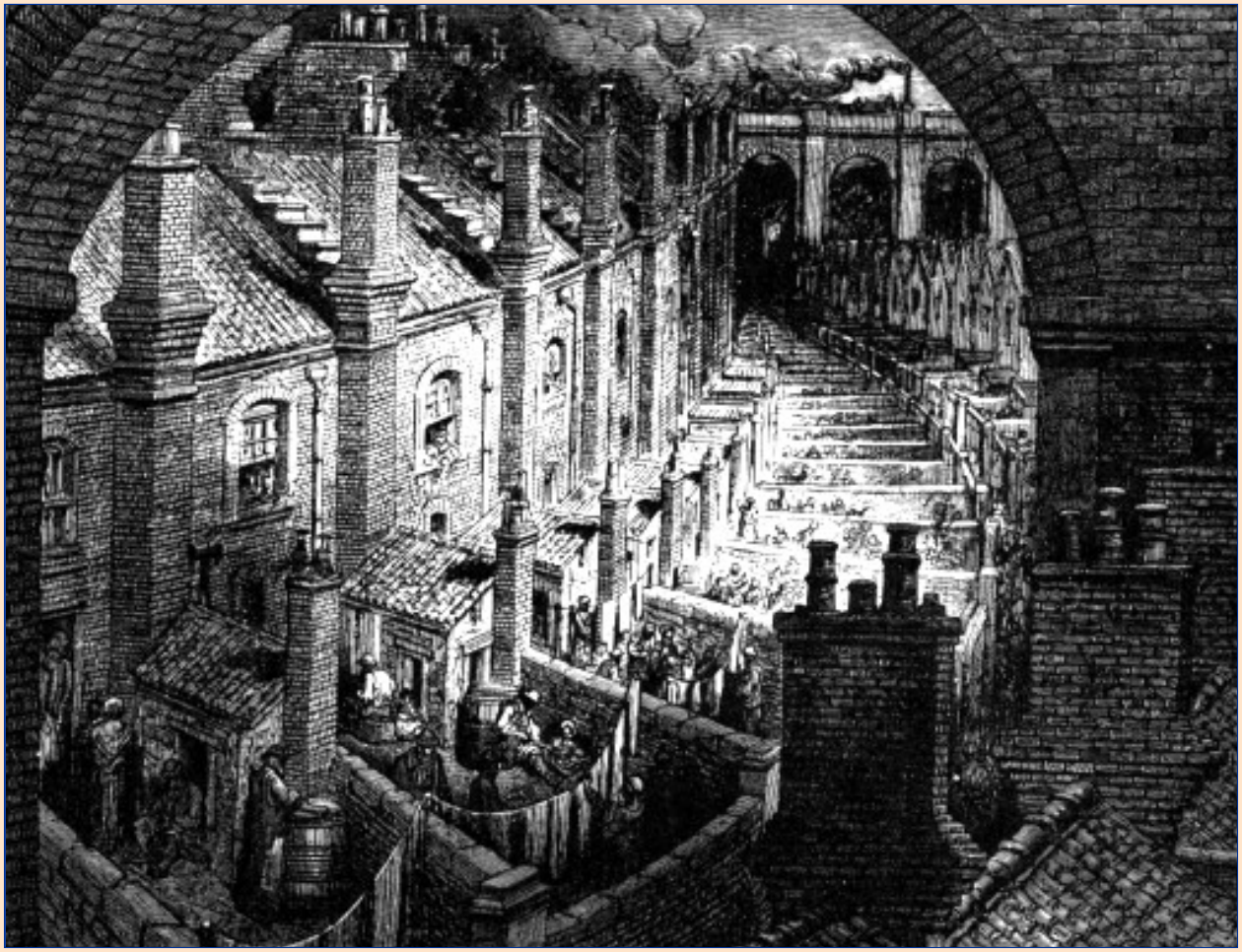
The New Industrial City

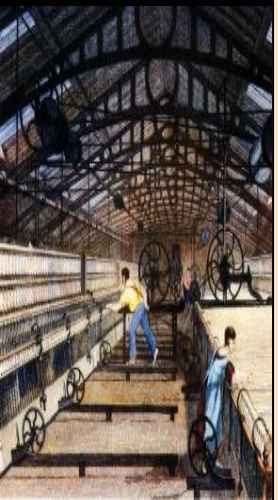


Overpopulation in towns and bad houses.
With *the "enclosures act" farmers had to abandon the countryside and to move to the cities where they lived in very bad conditions*: the houses were small and not safe, and they had to work in very bad places, such as mines and factories.

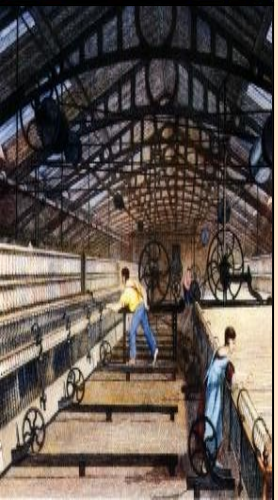


Early-19c London
by Gustave Dore





Factory Workers at Home



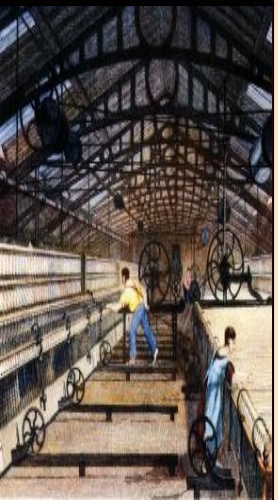
Young Coal Miners

Working condition and child labour.

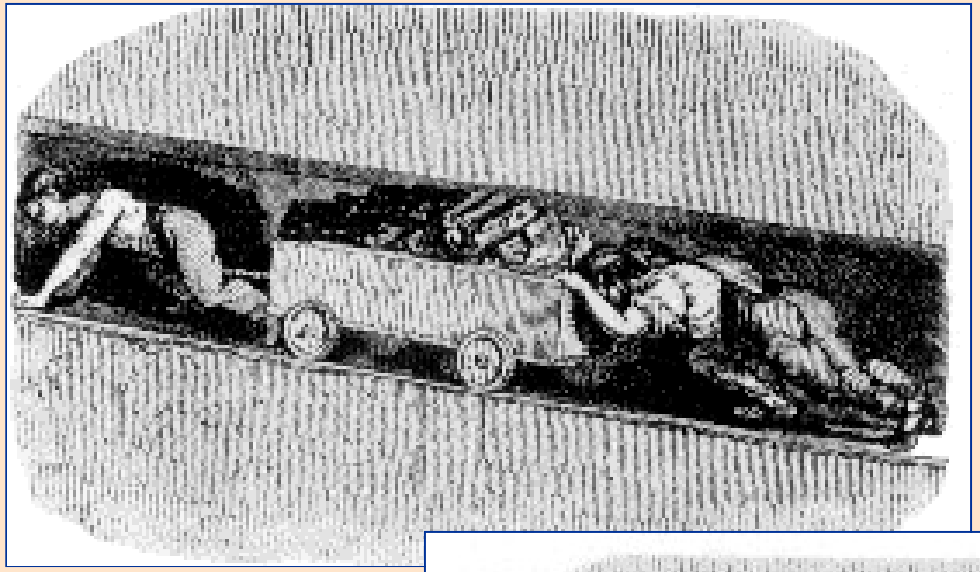
The *working time was from 12 to 16 hours* a day and the *pay was not enough for the survival of the family.*

So also **women and children had to work**. Their demand increased when machines didn't need any more the physic strength. *Moreover their pay was lower than men's one*.

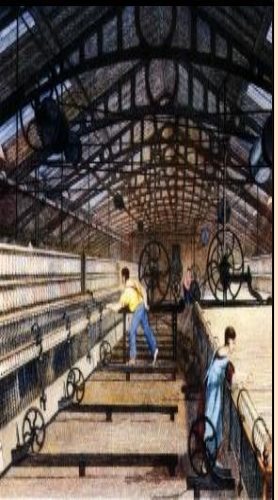
Children were exploited in mines to reach the narrowest places. For this reason many of them got ill and child mortality increased.



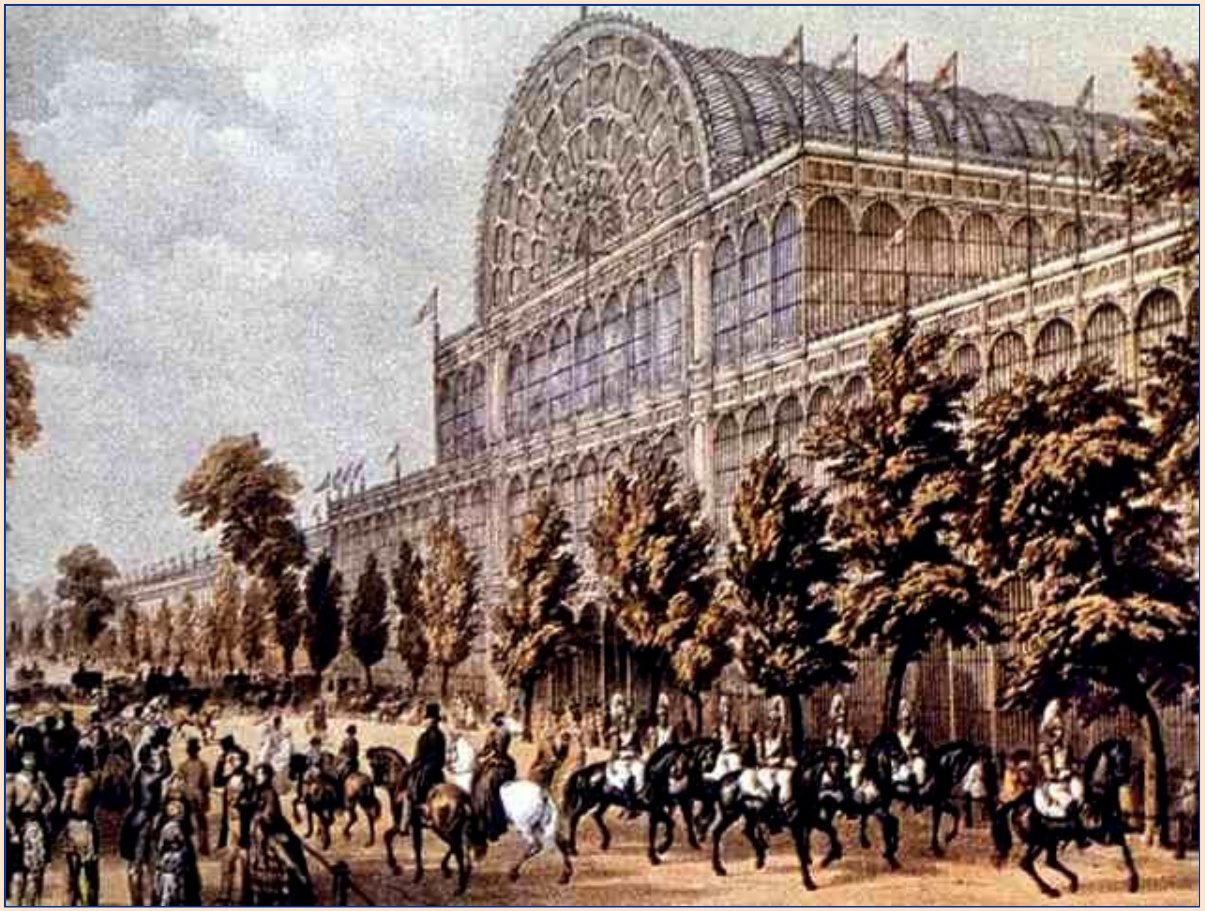
Child Labor in the Mines



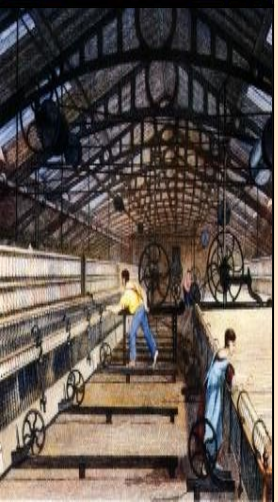
Child "hurriers"



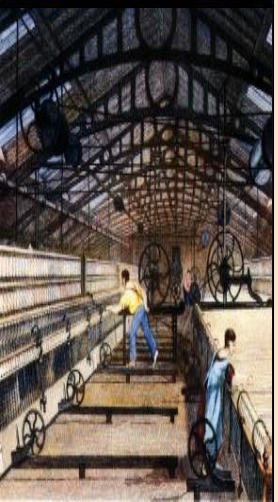
Crystal Palace Exhibition: 1851



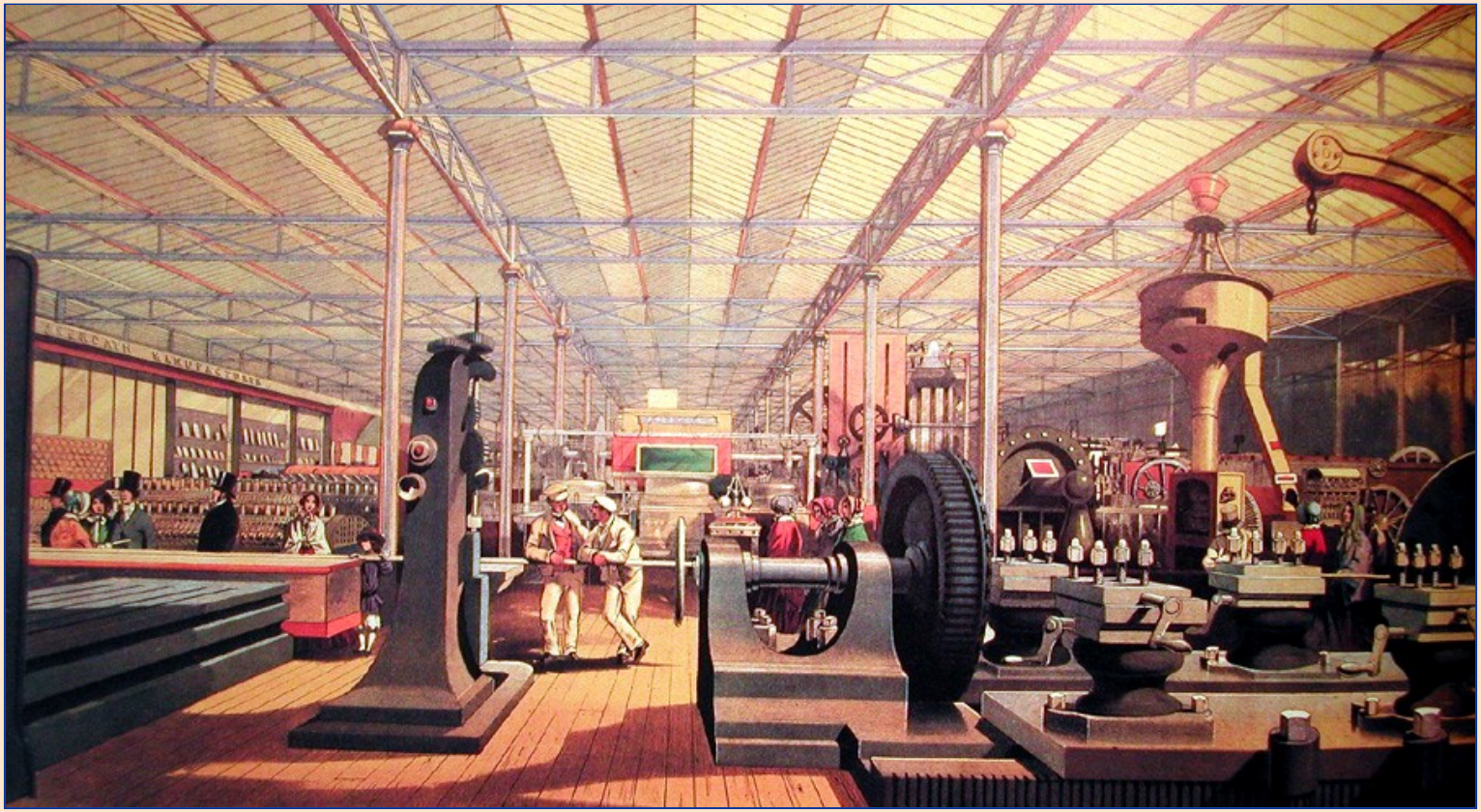
Exhibitions of the new industrial utopia.

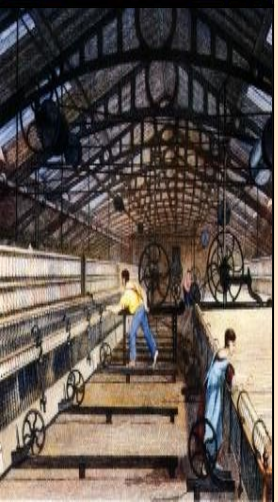


Crystal Palace: Interior Exhibits

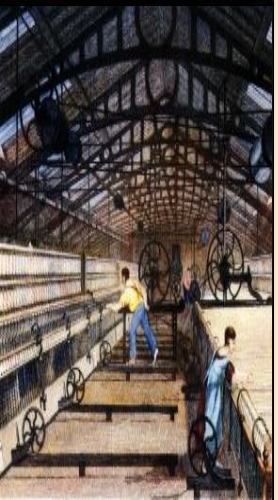


Crystal Palace:
British Ingenuity on Display

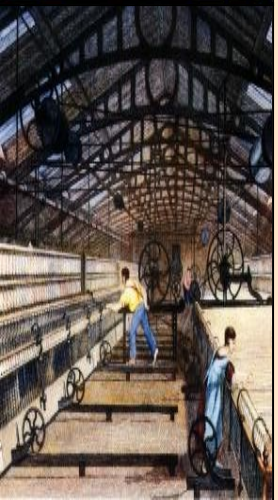




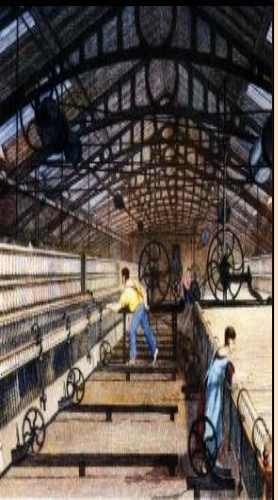
Crystal Palace: American Pavilion



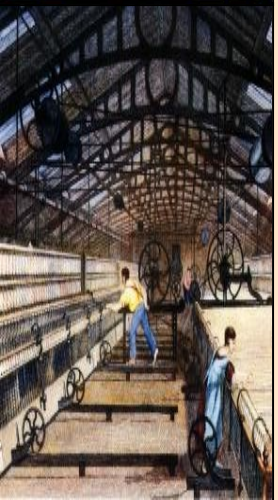
THE "HAVES": BOURGEOIS LIFE THRIVED ON THE LUXURIES OF THE INDUSTRIAL REVOLUTION



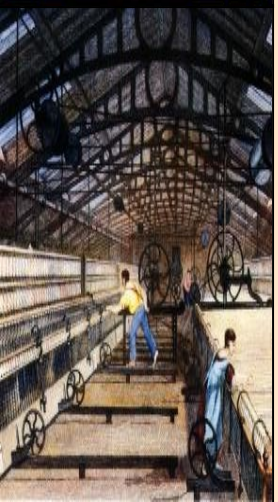
19c Bourgeoisie: The Industrial *Nouveau Riche*



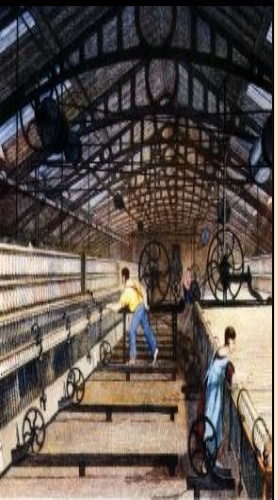
Criticism of the New Bourgeoisie



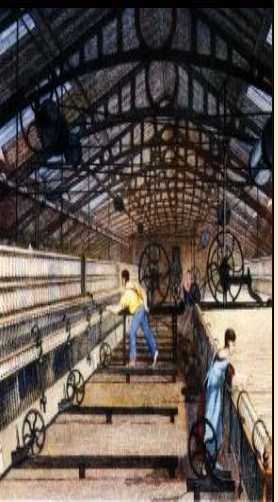
Stereotype of the Factory Owner



"Upstairs"/"Downstairs" Life

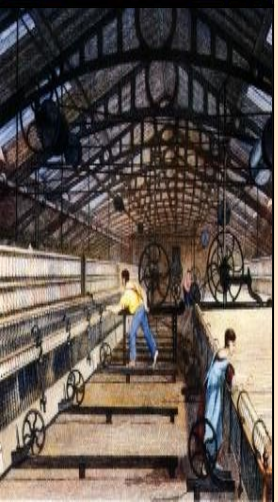


THE "HAVE-NOTS": THE POOR, THE OVER-WORKED & THE DESTITUTE

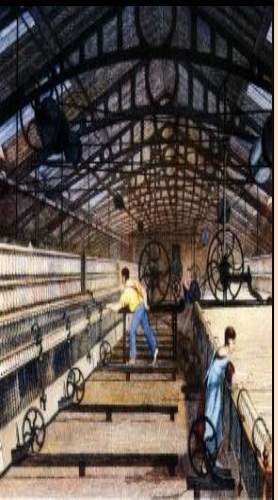


Factory Wages in Lancashire, 1830

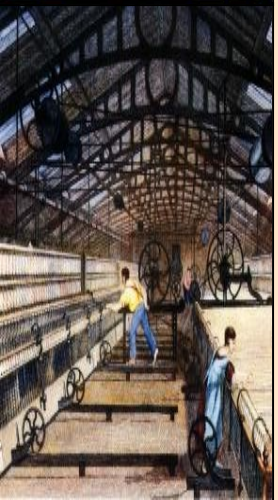
Age of Worker	Male Wages	Female Wages
under 11	2s 3d.	2s. 4d.
11 - 16	4s. 1d.	4s. 3d.
17 - 21	10s. 2d.	7s. 3d.
22 - 26	17s. 2d.	8s. 5d.
27 - 31	20s. 4d.	8s. 7d.
32 - 36	22s. 8d.	8s. 9d.
37 - 41	21s. 7d.	9s. 8d.
42 - 46	20s. 3d.	9s. 3d.
47 - 51	16s. 7d.	8s. 10d.
52 - 56	16s. 4d.	8s. 4d.
57 - 61	13s. 6d.	6s. 4d.



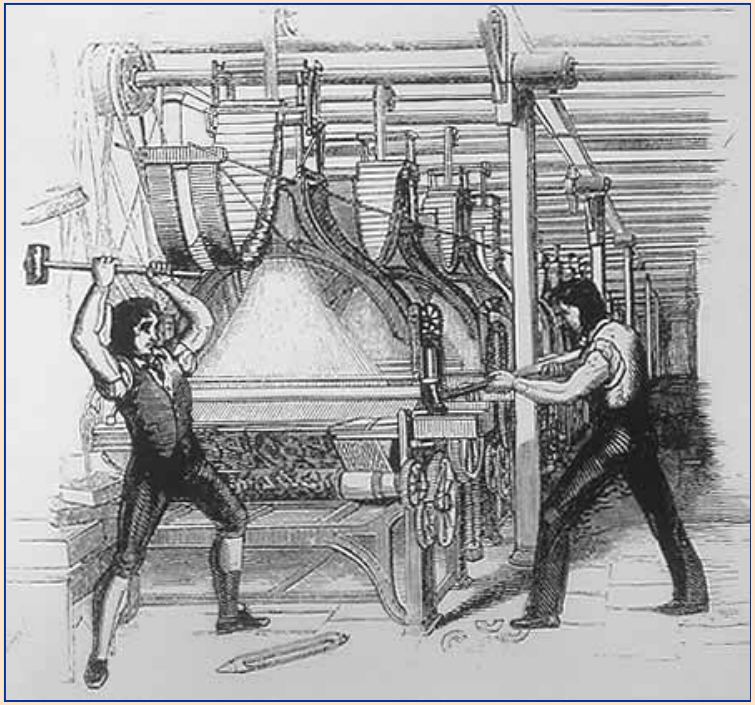
Private Charities: Soup Kitchens



PROTESTS & REFORMERS

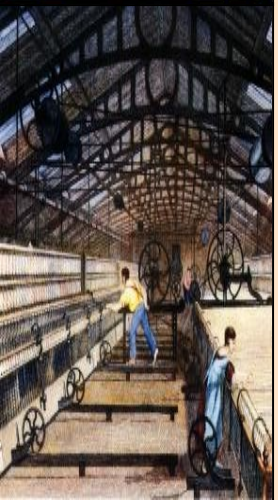


The Luddites : 1811-1816



The introduction of machines caused the unemployment of many craftsmen and weavers who could no longer complete with features that required time to produce more products and cloth than them.
So the unemployed workers began destroying features and machines that had token their job. These attackers became known as **Luddites**, supposedly followers of **Ned Ludd**, a folklore figure. The first attack wan in 1811.

Ned Ludd [a mythical figure supposed to live in Sherwood Forest]



The Luddites

WHEREAS,

Several EVIL-MINDED PERSONS have assembled together in a riotous Manner, and DESTROYED a NUMBER of

FRAMES,

In different Parts of the Country:

THIS IS

TO GIVE NOTICE,

That any Person who will give Information of any Person or Persons thus wickedly

BREAKING THE FRAMES,

Shall, upon CONVICTION, receive

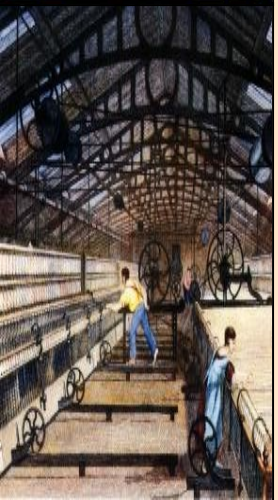
50 GUINEAS

REWARD.

And any Person who was actively engaged in RIOTING, who will impeach his Accomplices, shall, upon CONVICTION, receive the same Reward, and every Effort made to procure his Pardon.

☞ Information to be given to Messrs. COLDHAM and ENFIELD.

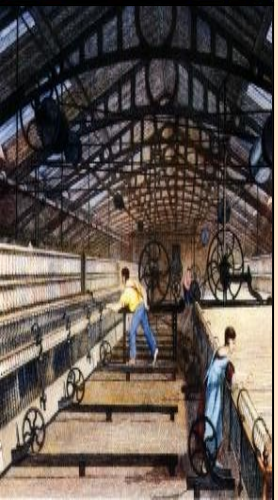
Nottingham, March 16, 1811.



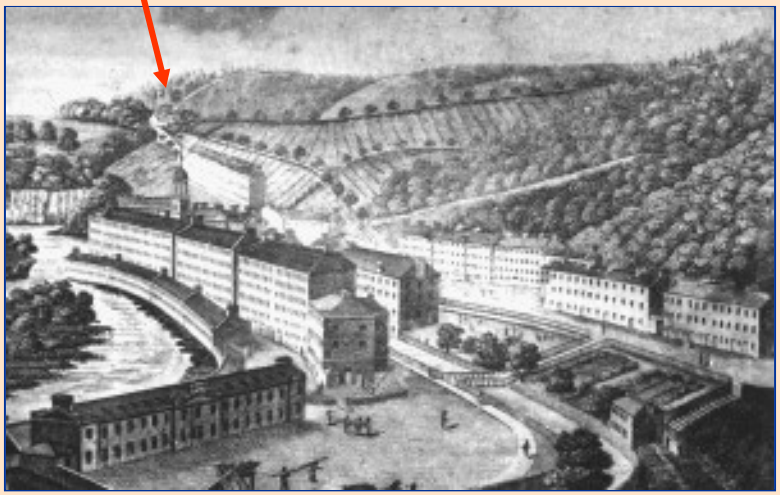
Peterloo Massacre, 1819

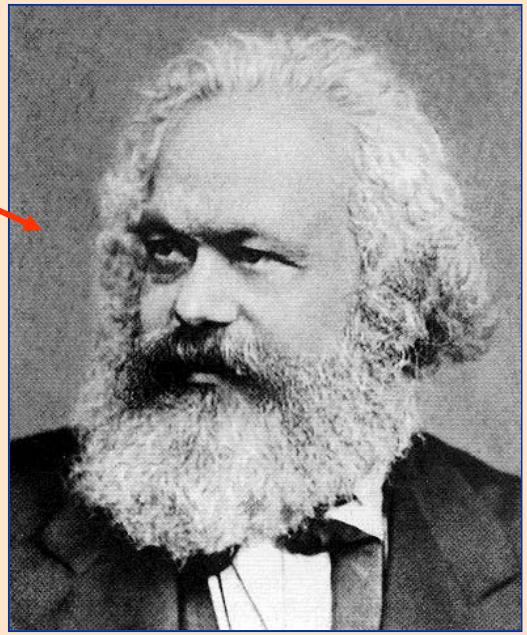
British Soldiers Fire on British Workers:

Let us die like men, and not be sold like slaves!

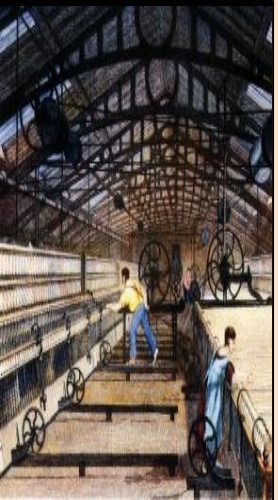


The Socialists: Utopians & Marxists

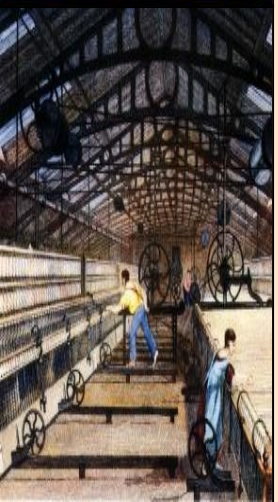




- People as a society would operate and own the means of production, not individuals.
- Their goal was a society that benefited everyone, not just a rich, well-connected few.
- Tried to build perfect communities [utopias].

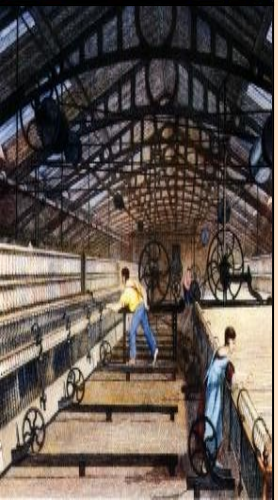


THE RESULTS OF INDUSTRIALIZATION AT THE END OF THE 19C

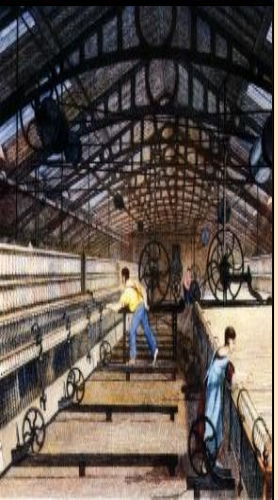


By 1850: Zones of Industrialization on the European Continent

- Northeast France.
- Belgium.
- The Netherlands.
- Western German states.
- Northern Italy
- East Germany → Saxony

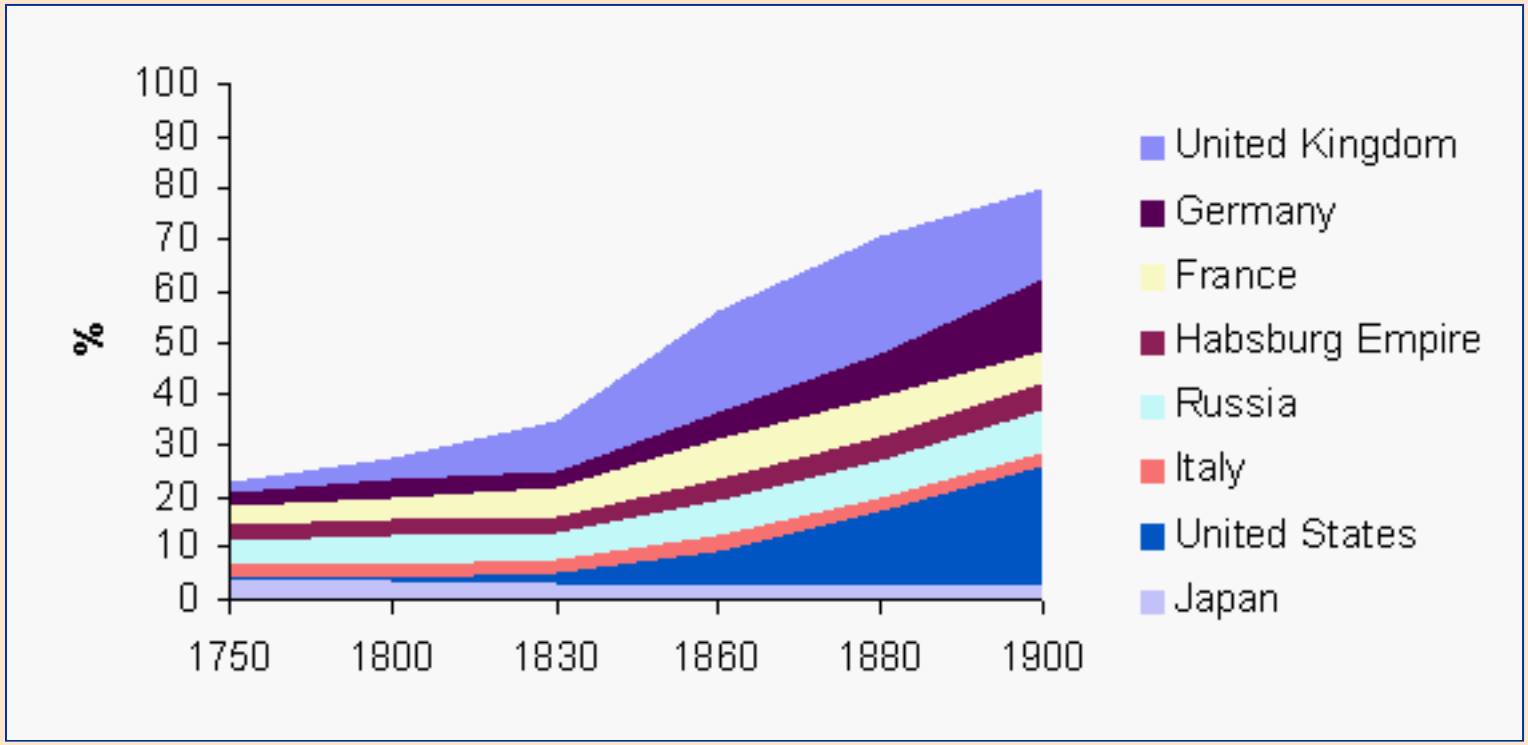


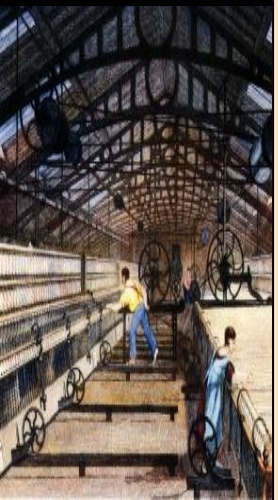
Industrialization By 1850



Railroads on the Continent

Share in World Manufacturing Output: 1750-1900





The Politics of Industrialization

- State ownership of some industries.
  - RRs → Belgium & most of Germany.
- Tariffs → British Corn Laws.
- National Banks granted a monopoly on issuing bank notes.
  - Bank of England.
  - Bank of France.
- Companies required to register with the government & publish annual budgets.
- New legislation to:
  - Establish limited liability.
  - Create rules for the formation of corporations.
- Postal system.
- Free trade zones → Ger. *Zollverein*