Science & Technology Thinking

INDUSTRIAL REVOLUTION

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WHAT IS INDUSTRIAL REVOLUTION ?

- The Industrial Revolution was a period of time where massive economic,technological, social, and cultural changes occurred.
- Industrial Revolution took place between the middle of 18th century to the early of 20th century and began in Great Britain, then subsequently spreading throughout Europe, North America and to the rest of the world.
- Industrial Revolution marked a major turning point in human history in almost every aspects of human life.
- Generally, Industrial Revolution are separated into 2 different parts which are Industrial Revolution 1.0 (IR 1.0) and Industrial Revolution 2.0 (IR 2.0).

SIGNIFICANT TECHNOLOGICAL DEVELOPMENTS DURING IR 1.0

1. Textile Industry
2. Iron Production
3. Steam Power
4. Agriculture
5. Transportation

TEXTILE INDUSTRY

Timeline of the development of textile industry during IR 1.0

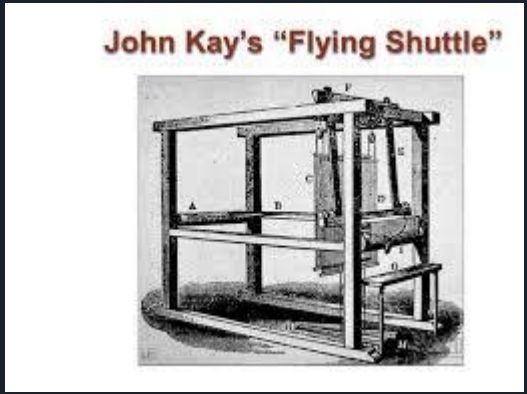
- Throughout the 18th century, several inventors had developed machines and techniques that revolutionise the productivity of the textile industry.

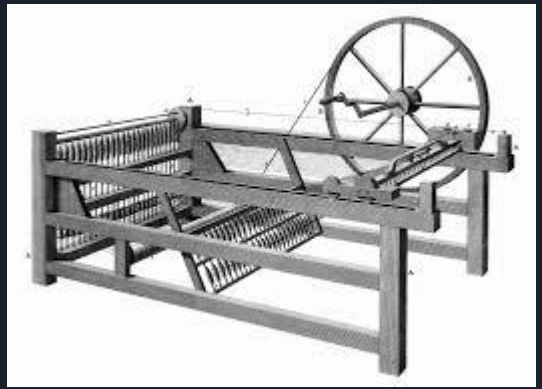
1. “Flying Shuttle” by John Kay (1733)

- Improved the process of hand-weaving looms.

1. “Spinning Jenny” by James Hargreaves (1764)

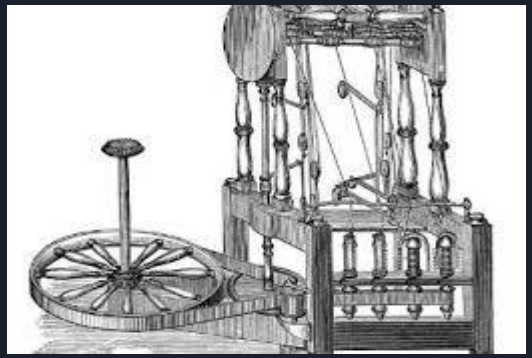
- Invented based on the “Flying Shuttle”
- Had multiple spinning frames which allowed workers to work with 8 or more spools of thread at a time.





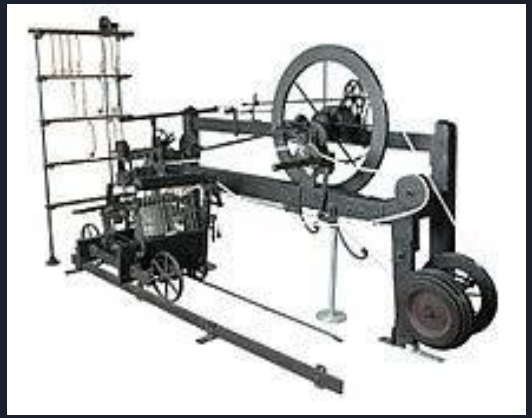
3. “Water Frame” by Richard Arkwright (1769)

- Based on “Flying Shuttle”
- First powered textile machine by water
- Capable of spinning 128 threads at a time
- Produce stronger and harder yarn



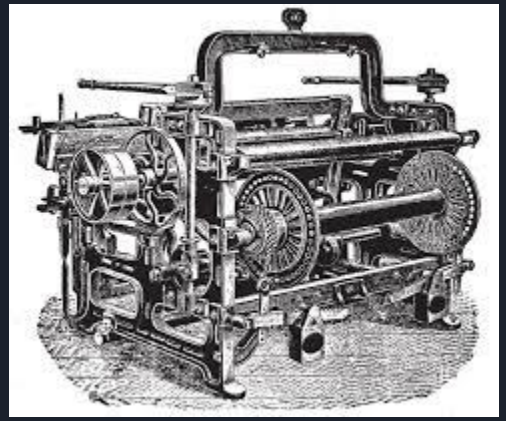
4. “Spinning mule” by Samuel Crompton (1779)

- Combination of ideas of “Spinning Jenny” and water frame
- Allowed greater control over weaving process
- Able to produce different types of yarn which are stronger,thinner and softer
- The carriage was able to carry up to 1320 spindle and could be 46m long.



5. “ Power loom” by Edmund Cartwright (1785)

- First spinning machine powered by steam engine
- Benefited from the invention of James Watt’s steam engine
- Built a fully-mechanized textile industry



IRON PRODUCTION

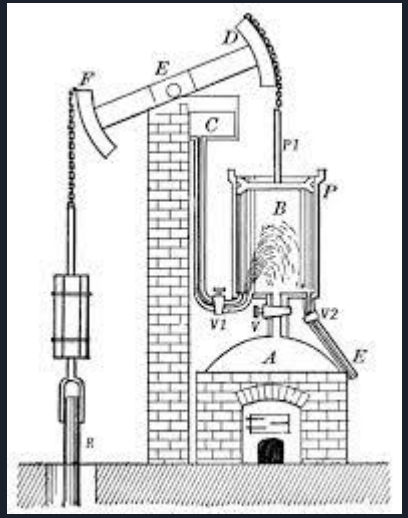
- Coal and iron played a very important role in the Industrial Revolution.
- At the early 18th century, iron makers discovered a new way to extract pure iron from iron ore using coke which was purer and burnt hotter than coal ,to melt the ore.
- By giving off same amount of heat, coal required less labour & time to be mined compared to traditional charcoal that was made up of woods.
- Thus, coal became the preferred source of fuel for steam engines and coal mines were booming especially at England during that time.
- As a result of transition from charcoal to coal , the production of iron increased dramatically and iron was used to produce goods that people needed likes machine frames, water pipes and rails for the industrial uses.

- Cast iron began to be used as structural material for bridges and buildings due to low cost of iron and later most cast iron was converted to wrought iron.
- In 1784, Henry Cort developed a new method of refining iron, Puddling process which reduced the cost of producing iron.
- This process was further improved by Baldwyn Rogers and John Hall and widely used after 1800s.
- The cheap supply of iron and steel aided in the rapid growth of machinery and engine industries throughout Britain and later the rest of the world.

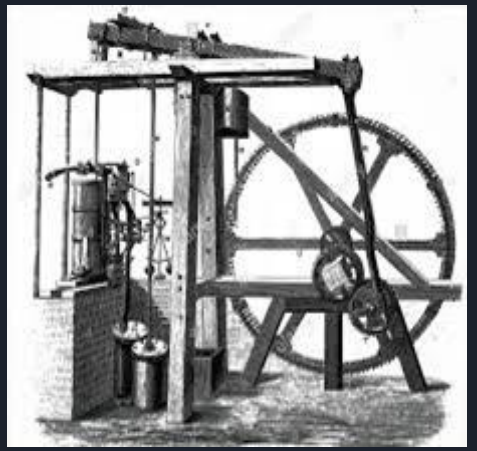
STEAM POWER

STEAM POWER

- Steam engine was one of the most important inventions during Industrial Revolution.
- At the beginning of the revolution, most of the industrial power was supplied by water and wind.
- Steam engine is a heat engine that performs mechanical works using steam as it’s working fluid and coal was the major fuel used for steam engine during the revolution.
- Thomas Newcomen (1712)- invented the first piston steam engine and the engine was first used in Staffordshire coal mines. It was very inefficient as it was estimated to be able to produce a 5 horsepower and also was very expensive to be built.

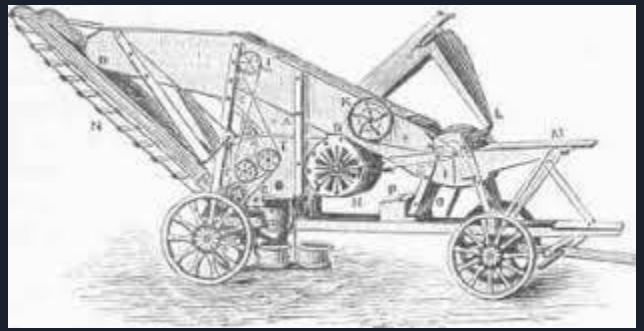


- In 1778, James Watt with the support of Matthew Boulton invented a version of steam engine which was more efficient as it only used a quarter of the coal needed per horsepower and also significantly smaller than Newcomen's steam engine.
- James Watt never ceased developing steam engine and his engine had evolved into a double-acting rotative type which can be directly attached to the rotary machinery of a factory or mill.
- Before 19th century, most of the steam engines were built as part of a building or structure and lasted until Richard Trevithick and Oliver Evans came up with a design of higher-pressure non-condensing steam engine.
- The high pressure design resulted in the development of engine and boiler that was compact enough to be used on rail locomotives and steam boats.

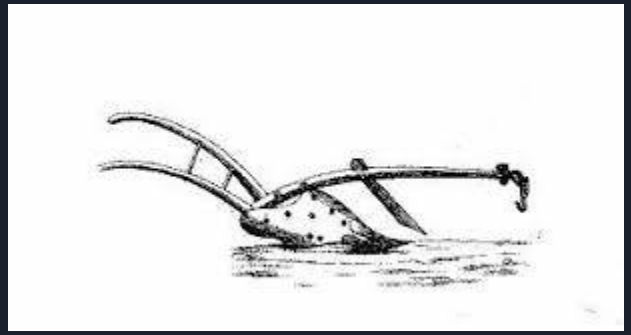


AGRICULTURE

- Improvement of agricultural productivity was one of the main causes that contributed to the Industrial Revolution.
- In 1701, Jethro Tull invented a Seed Drill which was able to distribute seeds evenly across large plots of land and plant seeds at the correct depth. This inventions had greatly saved a lot of time and manpower on sowing seeds.
- In 1784, Andrew Meikle invented a threshing machine which was used for the separation of grain from stalks and husks. This machine had replaced traditional hand threshing with a flail which was laborious and a time-consuming task.



- Joseph Foljambe invented Rotherham plough which was the first commercially successful iron plough. The Rotherham Plough was comparatively lighter and easier to use than traditional wooden plough. Besides that, it was handled by 2 horses and a person while traditional plough required 4 oxen, a ploughman and an ox driver.
- Industrial Revolution resulted in the mass production of agricultural equipment which further progressed the agricultural revolution.



TRANSPORTATION

TRANSPORTATION

- The growth of the Industrial Revolution depended on the ability to transport raw materials and finished goods over long distances.
- There were 3 main types of transportation that increased during the Industrial Revolution
  1. Waterways
  2. Roads
  3. Railroads
- The first horse railway was introduced at the end of the 18th century .
- The first steam engine locomotive was introduced at the beginning of the 19th century.
- Due to the development of high-pressure steam engine, more and more railways were rapidly introduced and connecting the large cities in the Europe.

INDUSTRIAL REVOLUTION 2.0

Industrial Revolution 2:

- Second industrial revolution began in the late 19th century (1870-1914).
- It was also known as the “Technological Revolution”.
- Countries involved: Britain, United States, Germany, Italy, and Japan.

What caused the IR:2?

Existence of Railroads

Immigration

Government Policy

Creative and Genius inventors

Notable Inventions:

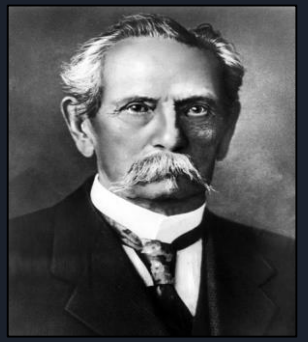
★ **Telephone**
★ Telephone was patented by Alexander Graham Bell in 1876.
★ It was used mainly to speed up business transactions.

- **Assembly Line**
- Assembly line was installed In 1913 by Henry Ford.
- A factory in which the machines and tools were systematically positioned to work in sequence.
- Able to assemble cars much faster and at a lower cost. (mass production)

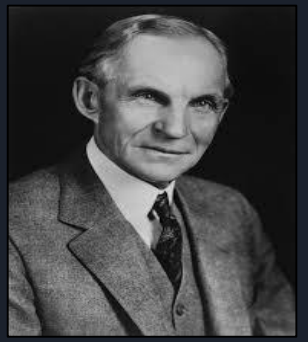
➢ **Light Bulb**
➢ Light bulb was invented by Thomas Edison in 1879.
➢ Provides light to make us able to see objects in the dark.

Impacts of IR:2

- Communicate to all people and travel around the world.
- Improvement in Public Health.
- Extend working hours.
- Reduction in the prices of goods.



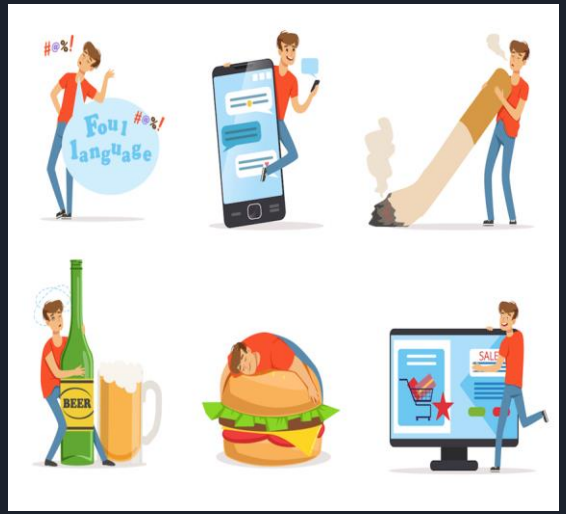
Karl Benz



Henry Ford

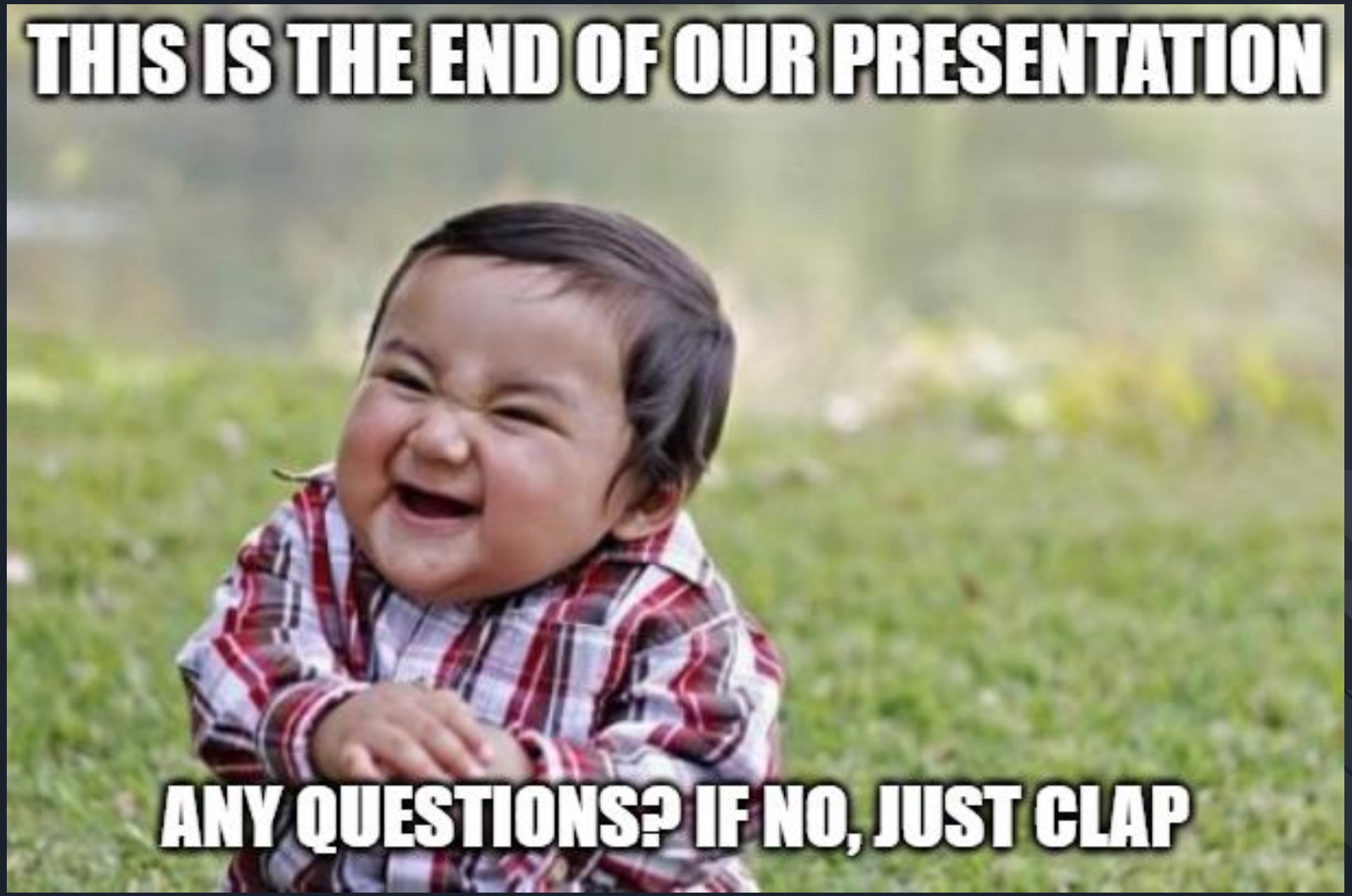
NEGATIVE EFFECTS OF INDUSTRIAL REVOLUTION HAPPENING EVEN TODAY

- Overcrowding of Cities and Industrial Towns
- Pollution and environmental issues
- The Rise in Unhealthy Habits



What have we learnt?

- The greatest revolution that had taken place
- Had both positive and negative effects on mankind
- Learn from our mistakes
- Progress further and become more developed together


THIS IS THE END OF OUR PRESENTATION
ANY QUESTIONS? IF NO, JUST CLAP


IGHT IMMA HEAD OUT