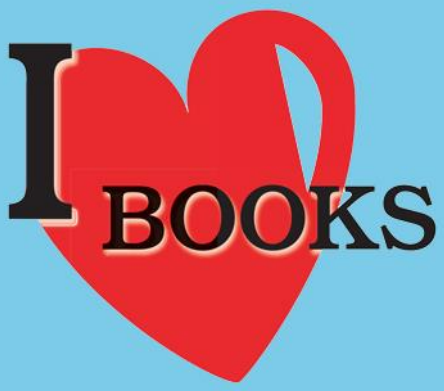


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WHEELS

Wheels are an ancient form of technology that we still use today. They exist in obvious places, like cars, and also in places you might not expect, like engines and turbines.

Although humans had been hunting and building things with heavy materials for years, the animals they hunted and the materials they needed were difficult to move. Then came the discovery of wheels, which allowed them to move things more easily...

1 LOG ROLLERS

The first step in the invention of the wheel began during the PALAEOLITHIC ERA (between 15,000 and 750,000 years ago), with the use of LOG ROLLERS. Circular tree stumps carried heavy objects as they turned over the ground. As the heavy object moved forward, the back logs were brought to the front.



Our log rollers paved the way for the invention of the wheel.

FRICTION is a force that makes heavy objects difficult to move. Although friction wasn't properly understood until many hundreds of years later, early humans noticed its effect on heavy objects and looked for ways to overcome it.

Friction makes an object more difficult to move and slows it down. A much greater PUSHING FORCE is needed to give the object a FORWARD MOTION.

Wheels help to reduce this friction by reducing the amount of contact area between two surfaces. This then reduces the resistant friction that the two surfaces create when they touch one another.



3 WATER WHEELS

WATER WHEELS date back to the time of the ancient Greeks and Romans. They were also used in China as early as the 1st century. They lifted water in wooden buckets from a river to a dry field, to water crops.



WATER MILLS worked in a similar way: flowing water turned a wheel that was connected to a stone, which would grind grain into flour.



2 THE WHEEL AND AXLE

Today, we are most used to seeing wheels and axles on cars or bikes, but they were first invented for the POTTER'S WHEEL in 3500 BC.

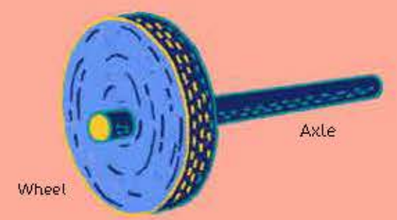
At this time, skilled potters in Mesopotamia (now Iraq) quickly spun flat wooden disks by hand, which helped them mould their pottery.

These potters' wheels allowed them to set up factories and produce lots of pots each day.



The same technology became really useful when a pair of wheels were mounted onto an AXLE a rod connecting the wheels together.

This meant that an object or a person could be carried on a stationary platform, like a chariot, while the wheels rolled freely underneath.



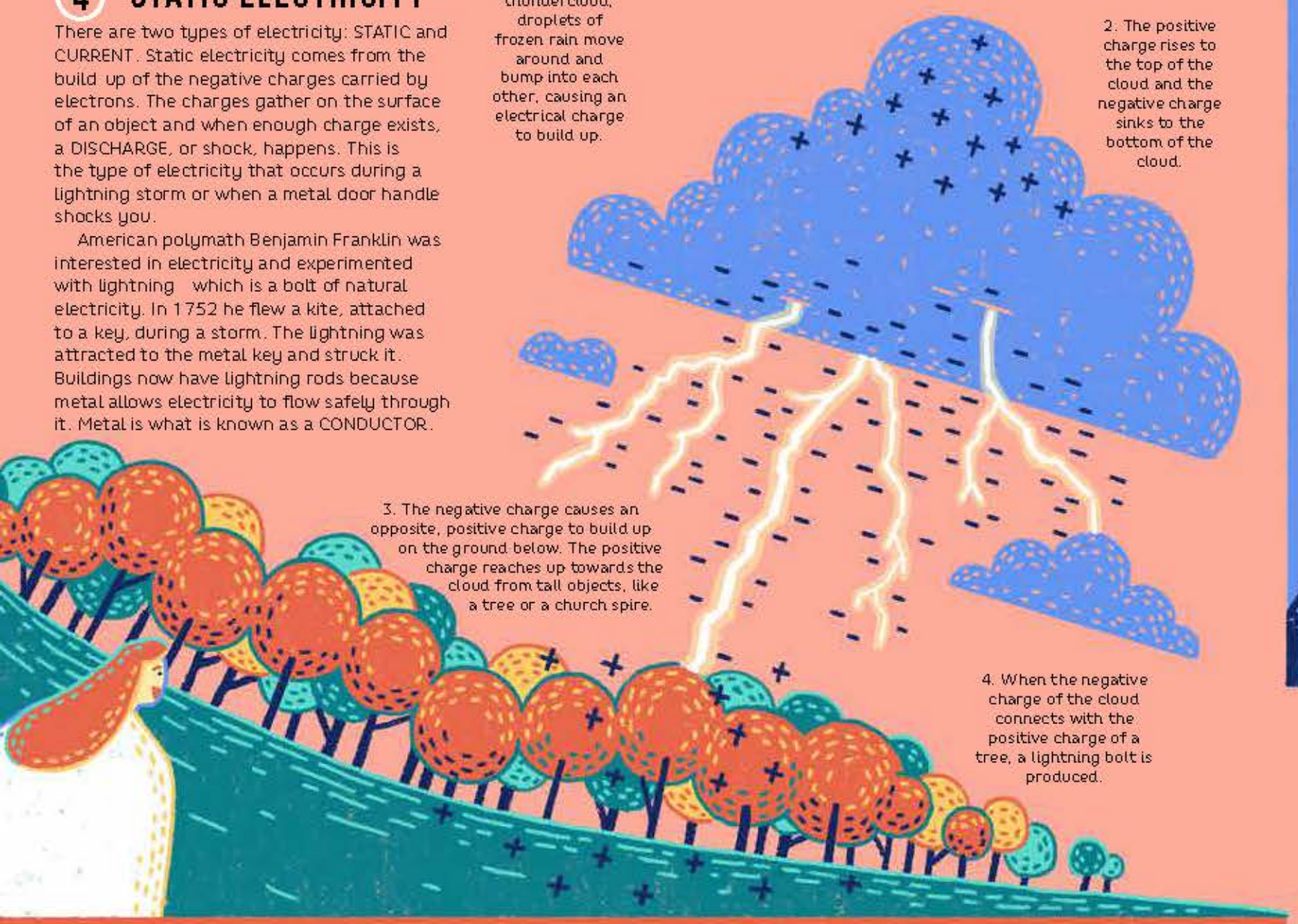


Around 2000 BC, the first chariots with spoked wheels were invented in western Asia. The Persians (modern day Iran) added to the invention with scythes long blades attached to the wheels, giving the Persian army an advantage over their enemies in war.

4 STATIC ELECTRICITY

There are two types of electricity: STATIC and CURRENT. Static electricity comes from the build up of the negative charges carried by electrons. The charges gather on the surface of an object and when enough charge exists, a DISCHARGE, or shock, happens. This is the type of electricity that occurs during a lightning storm or when a metal door handle shocks you.

American polymath Benjamin Franklin was interested in electricity and experimented with lightning which is a bolt of natural electricity. In 1752 he flew a kite, attached to a key, during a storm. The lightning was attracted to the metal key and struck it. Buildings now have lightning rods because metal allows electricity to flow safely through it. Metal is what is known as a CONDUCTOR.



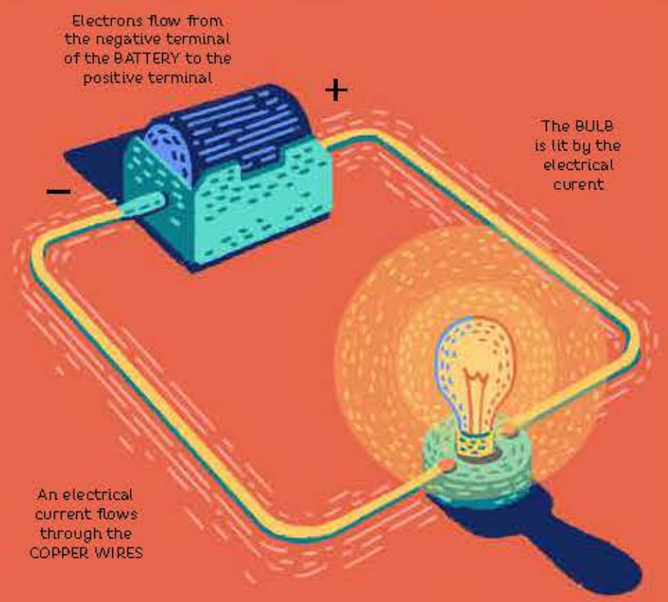
5 DIRECT CURRENT ELECTRICITY

CURRENT electricity comes from the movement, or flow, of electrons. This is the type that we generate in power station. It is supplied to buildings through wires or stored in batteries. When we plug an appliance in, or charge our gadgets, we use electricity to power our modern lives.

Electricity is caused by electrons. Electrons carry negative charge and when they flow through a metal wire from a battery or socket they create an electrical current. A circuit is a complete loop of wire that the electrons can travel around. The current powers things around the circuit, like light bulbs or household appliances.

There are two types of electrical current: DIRECT CURRENT and ALTERNATING CURRENT. The first to be discovered was direct current: electricity that flows in one direction.

Italian physicist Alessandro Volta invented the first battery around 1800. It was called a VOLTAIC PILE and was made of layers of discs of copper and zinc sandwiched between pieces of paper that had been soaked in salty water. When a piece of copper wire linked the top and bottom of the battery, a current flowed. The unit for measuring electricity is named VOLT in his honour. Direct current electricity is still found in batteries today.



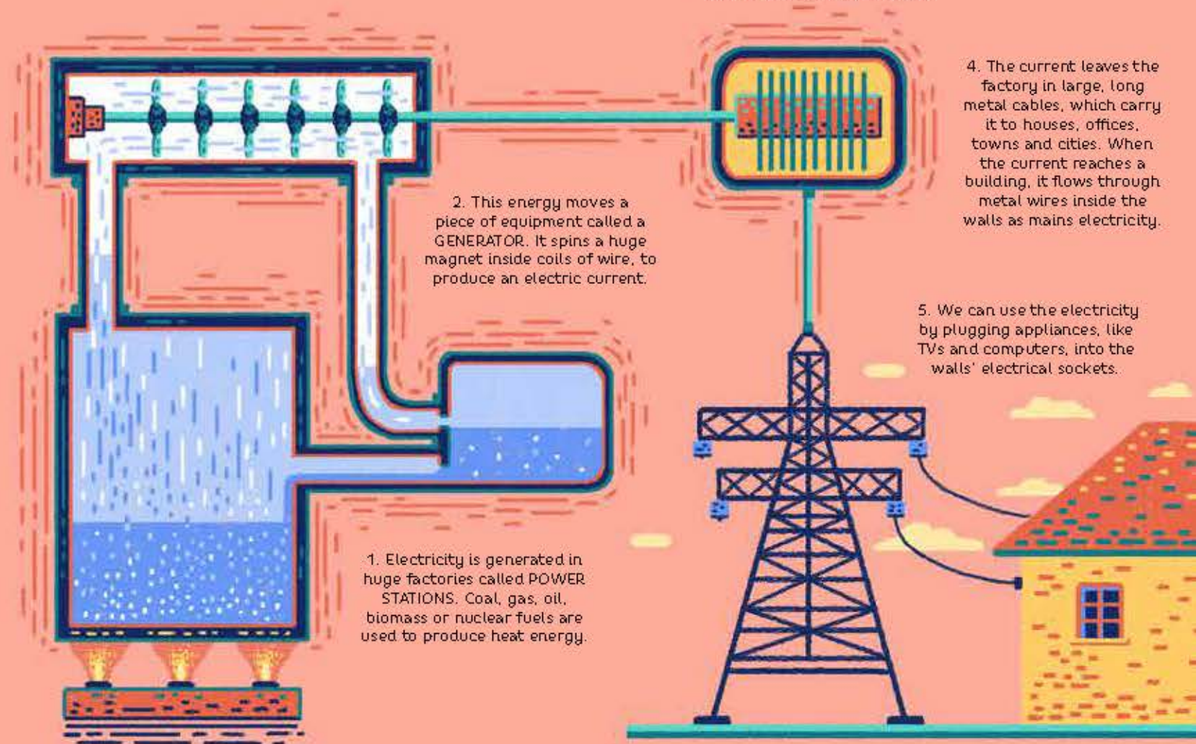
6 ALTERNATING CURRENT ELECTRICITY

Serbian American inventor Nikola Tesla discovered the second type of electrical current, ALTERNATING CURRENT, in 1887. This flowed in one direction and then reversed and flowed back in the opposite direction, many times a minute. Alternating current electricity is used in the mains electricity that travels to our buildings through cables and wires.

An influential inventor at the time, Thomas Edison, had invested all his time and money into making direct current electricity the electricity that the public would use. Yet it could not be easily adapted to different voltages for different uses. Tesla believed that alternating current electricity was more efficient and was the future of the electrification of homes and cities.

In the 1880s, the two men and their companies had a long, pubic argument called 'The War of the Current'. They fought about who was right, which power supply was better, cheaper and safer. Eventually alternating current electricity won the argument and is now the current used around the world.

7 GENERATING ELECTRICITY



8 NUCLEAR FISSION

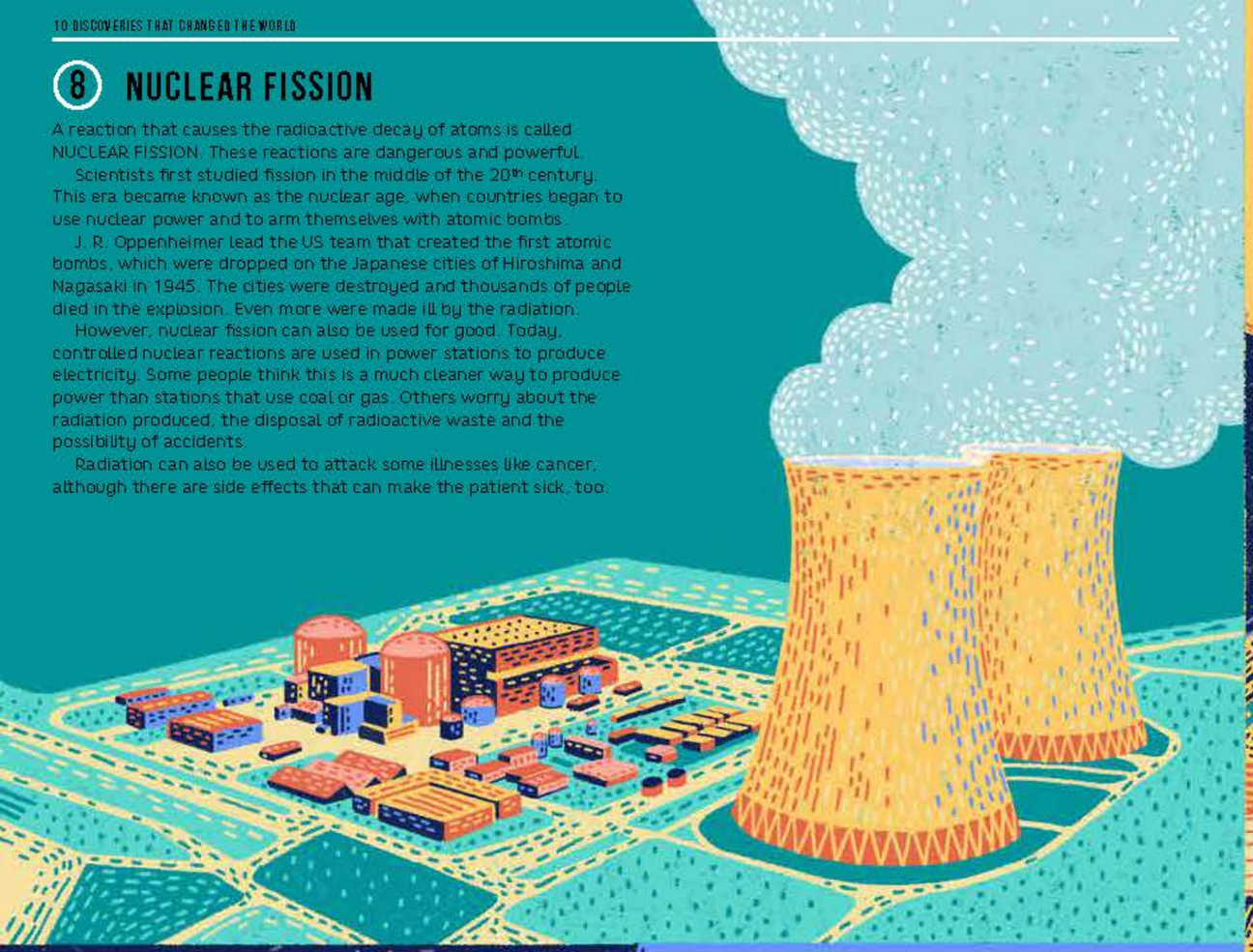
A reaction that causes the radioactive decay of atoms is called NUCLEAR FISSION. These reactions are dangerous and powerful.

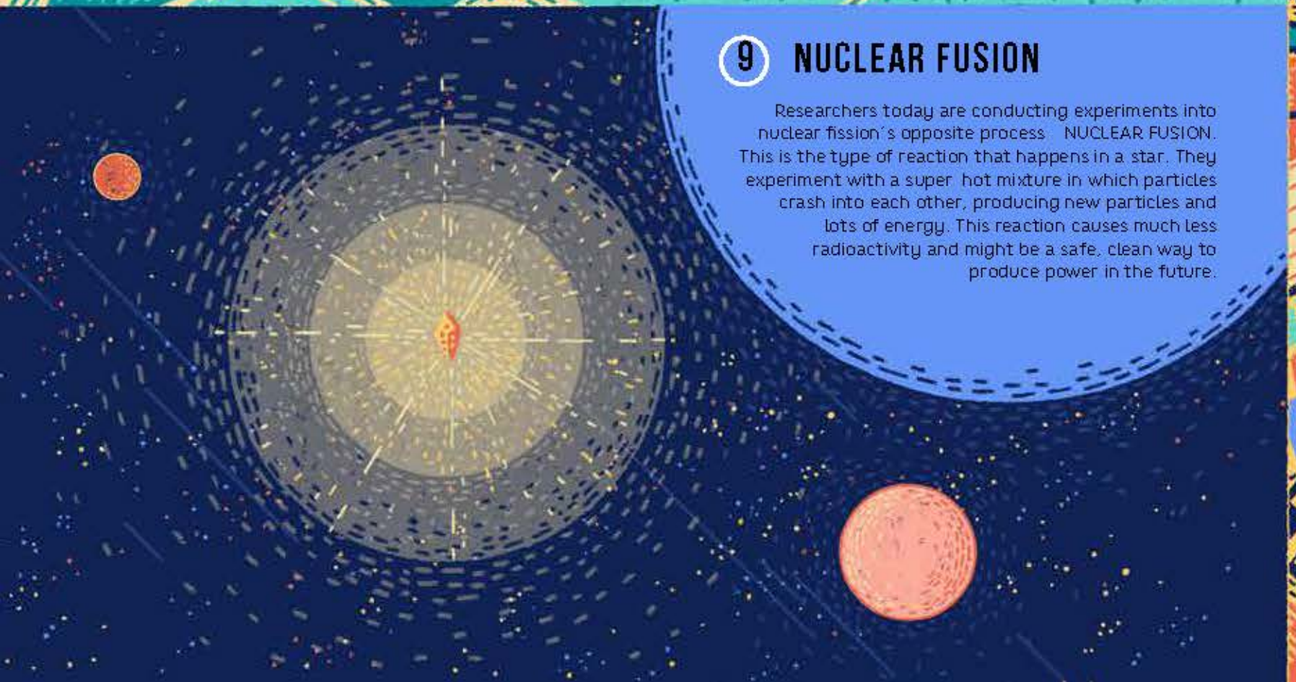
Scientists first studied fission in the middle of the 20th century. This era became known as the nuclear age, when countries began to use nuclear power and to arm themselves with atomic bombs.

J. R. Oppenheimer lead the US team that created the first atomic bombs, which were dropped on the Japanese cities of Hiroshima and Nagasaki in 1945. The cities were destroyed and thousands of people died in the explosion. Even more were made ill by the radiation.

However, nuclear fission can also be used for good. Today, controlled nuclear reactions are used in power stations to produce electricity. Some people think this is a much cleaner way to produce power than stations that use coal or gas. Others worry about the radiation produced, the disposal of radioactive waste and the possibility of accidents.

Radiation can also be used to attack some illnesses like cancer, although there are side effects that can make the patient sick, too.





9 NUCLEAR FUSION

Researchers today are conducting experiments into nuclear fission's opposite process – NUCLEAR FUSION. This is the type of reaction that happens in a star. They experiment with a super hot mixture in which particles crash into each other, producing new particles and lots of energy. This reaction causes much less radioactivity and might be a safe, clean way to produce power in the future.

10 SMALLER PARTICLES

Scientists now think that some tiny particles are themselves made of even tinier particles. These tiny particles have unusual names like QUARKS, ANTIQUARKS, BOSONS and LEPTONS. They are as small as electrons and have their own characteristics.

In 2008, the CERN research centre on the border between French and Switzerland opened the Large Hadron Collider. This is a giant laboratory for thousands of scientists from around the world. A huge tunnel, 27 kilometres long, is used to conduct experiments that mirror the moments right after the Big Bang. This allows them to study how subatomic particles behave and to discover brand new particles, too.

