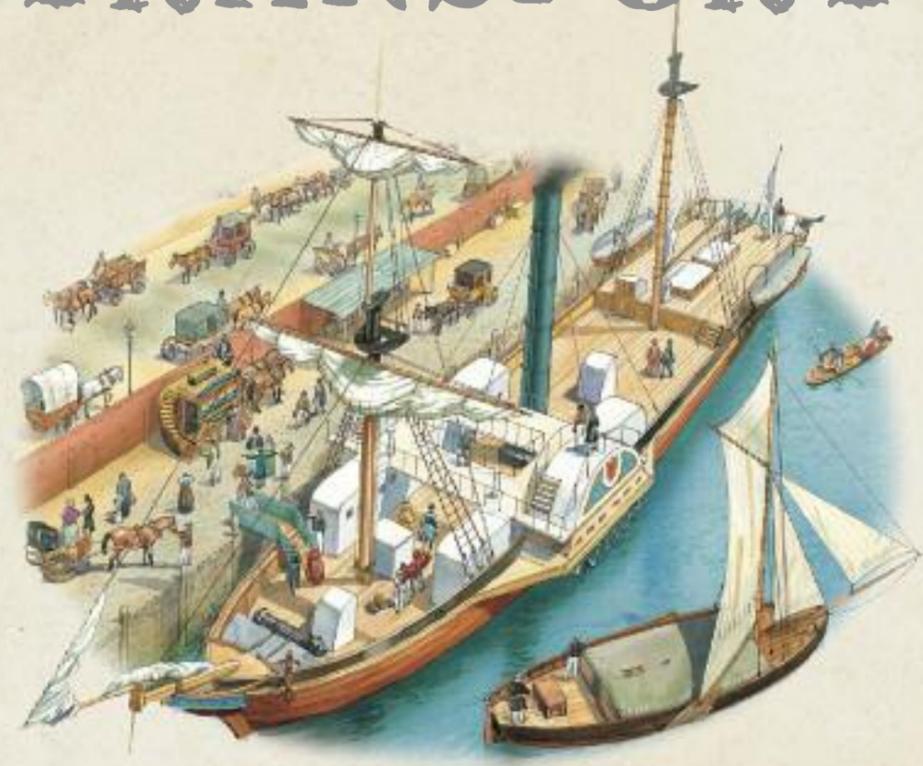


The story of **TRANSPORT**



The story of
TRANSPORT



illustrated by
Peter Dennis

 Orpheus

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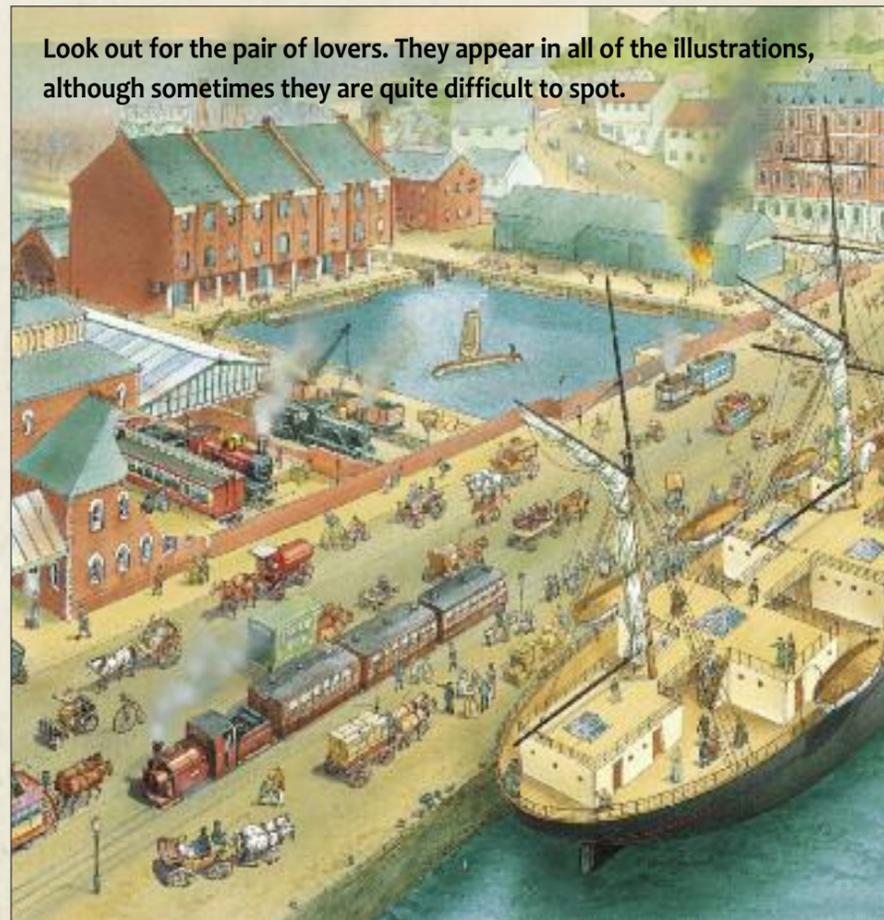
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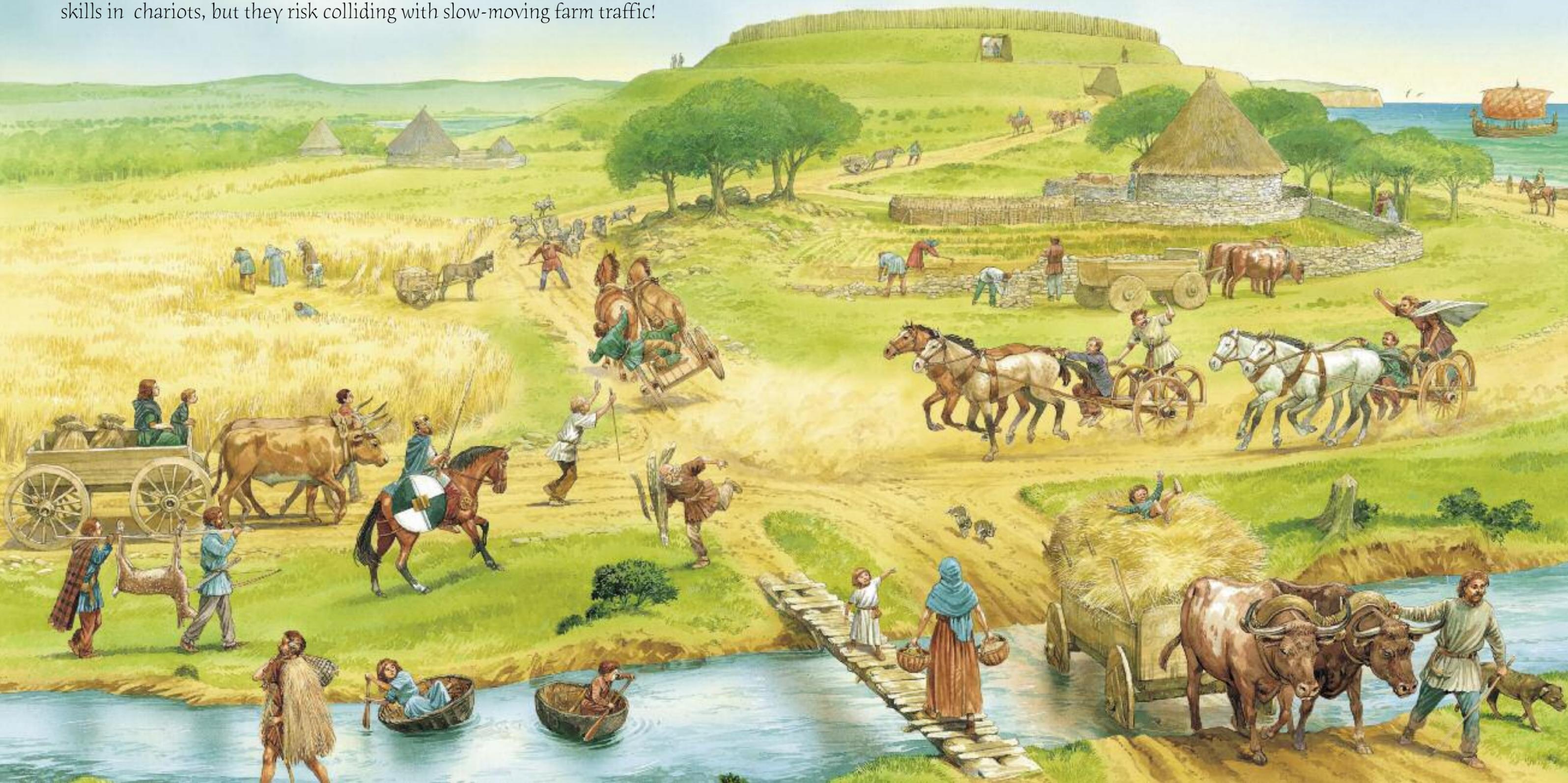
Look out for the pair of lovers. They appear in all of the illustrations, although sometimes they are quite difficult to spot.

Imagine you are somewhere in Europe, not far from the coast, thousands of years ago. Ox carts rumble along dirt tracks. Out to sea, a small sailing ship cuts through the waves. As the years go by, roads and bridges are built. A small quay is constructed, allowing ships to moor in the harbour. Gradually, people are able to travel farther, faster and in greater comfort. This is the story of transport through the ages.



Our story begins 3000 years ago. People travel along rough tracks in carts drawn by their animals. Oxen and mules pull heavy loads of hay or grain while horses are harnessed to faster vehicles. Some young men are practising their driving skills in chariots, but they risk colliding with slow-moving farm traffic!

All road vehicles must cross the stream at a ford, a place where the water is shallow enough to wade across. Only those on foot can use the small wooden bridge. Some people travel downstream in circular rowing boats made from woven twigs and animal skins. Out at sea, a wooden sailing boat cruises by.



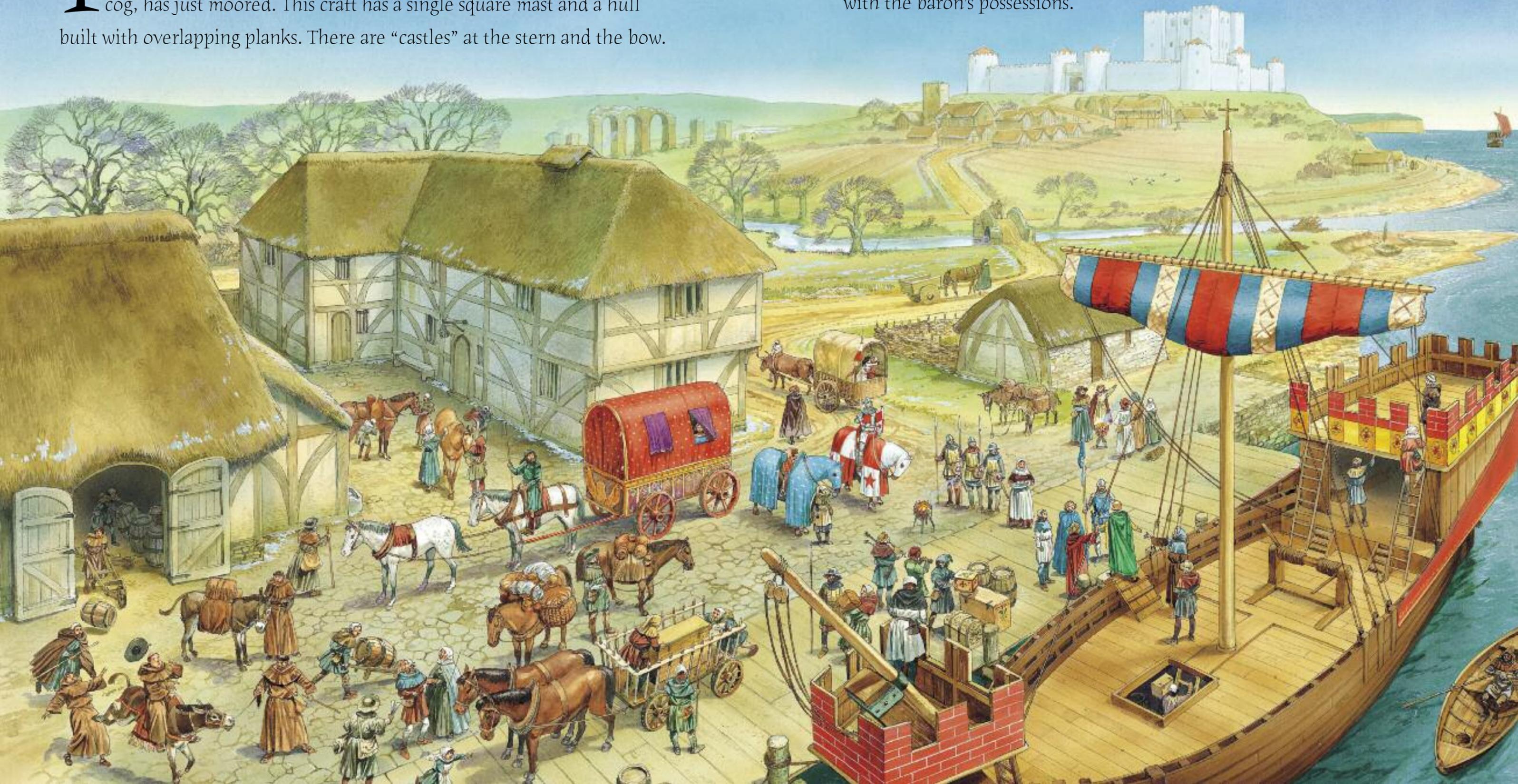
A thousand years later, the Romans have conquered these lands. Where once there stood a simple hillfort, the soldiers have built a stronger stone fortress. The old rough farm tracks have been replaced by proper paved roads.

Chariots, ox wagons and legions of Roman soldiers all cross the river by a sturdy bridge. The Romans have also built an aqueduct. Its stone arches support a canal which carries water across the valley.



It is now the year 1300: the Middle Ages. The Romans have long since gone. The aqueduct lies in ruins, but a magnificent castle stands in place of the fortress. Down by the waterfront a trading ship, called a cog, has just moored. This craft has a single square mast and a hull built with overlapping planks. There are “castles” at the stern and the bow.

Stepping ashore is a visiting lady. She is greeted by the lord of the castle, together with knights, guards, musicians and servants. A carriage awaits to carry the lord’s guest back up to the castle. Carts and horses are loaded up with the baron’s possessions.



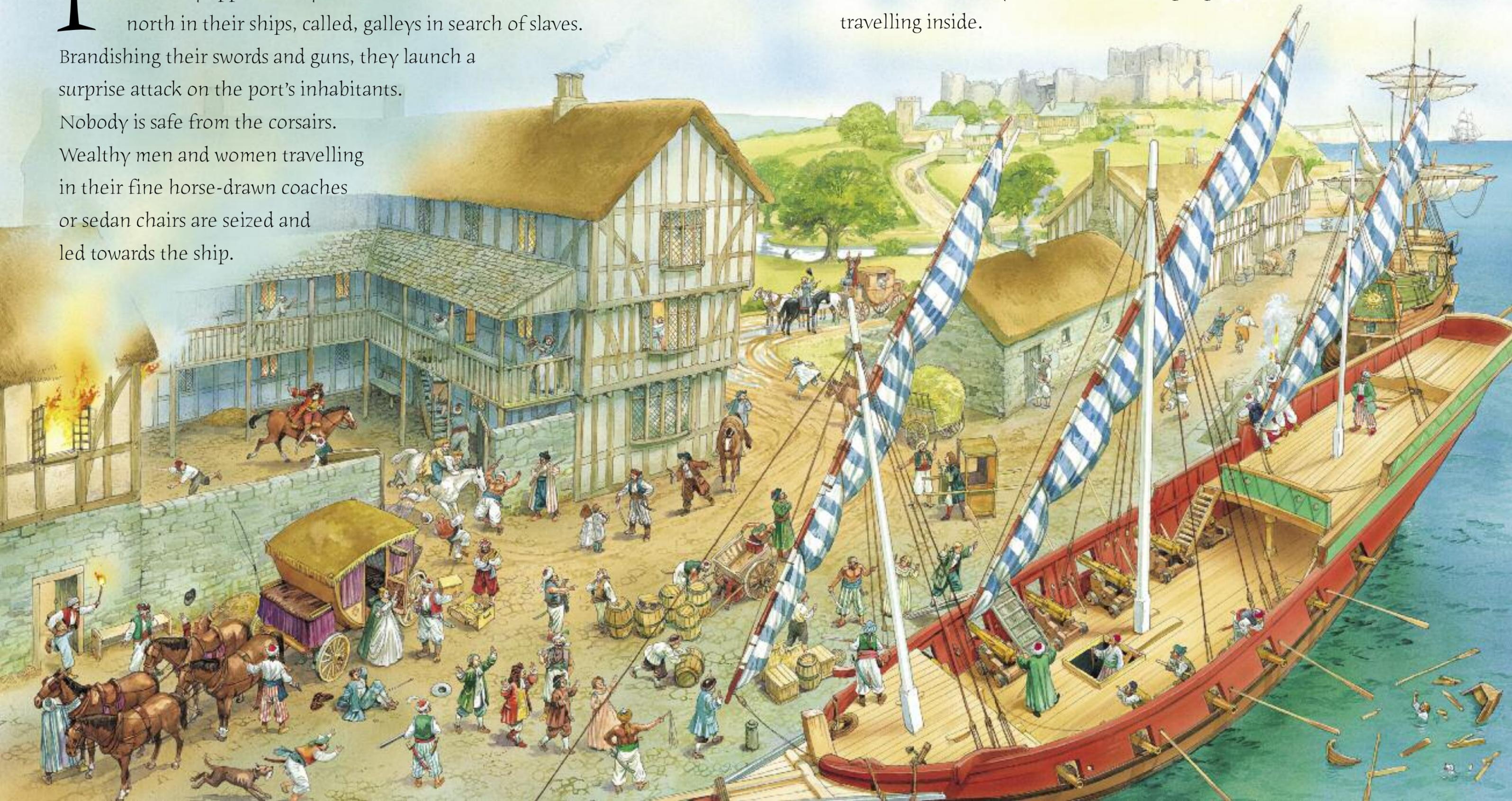
Four hundred years later and terror strikes! Arab pirates from the northern coast of Africa, known as Barbary corsairs, suddenly appear. They have sailed hundreds of kilometres north in their ships, called, galleys in search of slaves.

Brandishing their swords and guns, they launch a surprise attack on the port's inhabitants.

Nobody is safe from the corsairs.

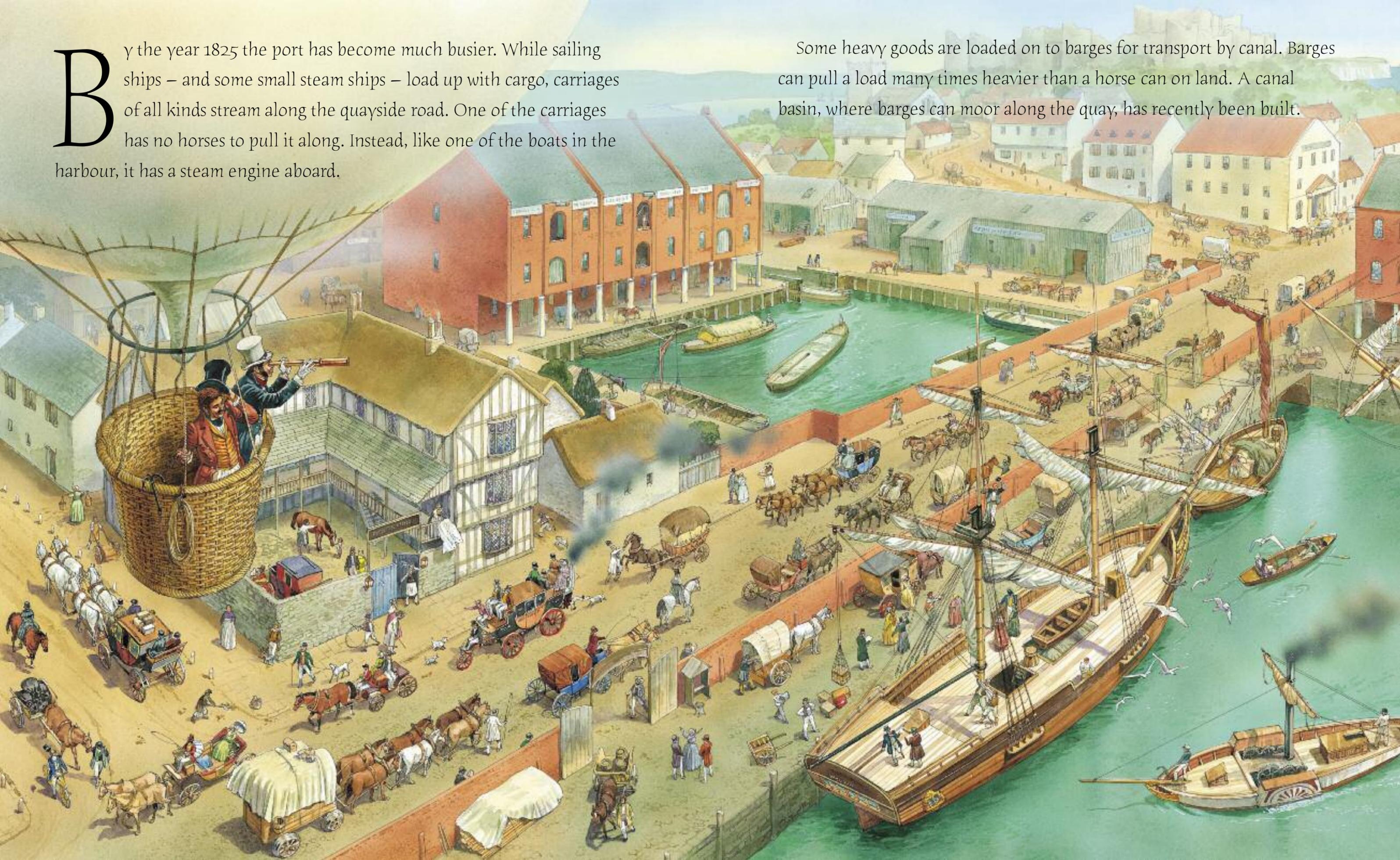
Wealthy men and women travelling in their fine horse-drawn coaches or sedan chairs are seized and led towards the ship.

While the corsairs ransack the harbour, a carriage on its way to the port has been stopped by a highwayman carrying a pistol. He demands money from the terrified people travelling inside.



By the year 1825 the port has become much busier. While sailing ships – and some small steam ships – load up with cargo, carriages of all kinds stream along the quayside road. One of the carriages has no horses to pull it along. Instead, like one of the boats in the harbour, it has a steam engine aboard.

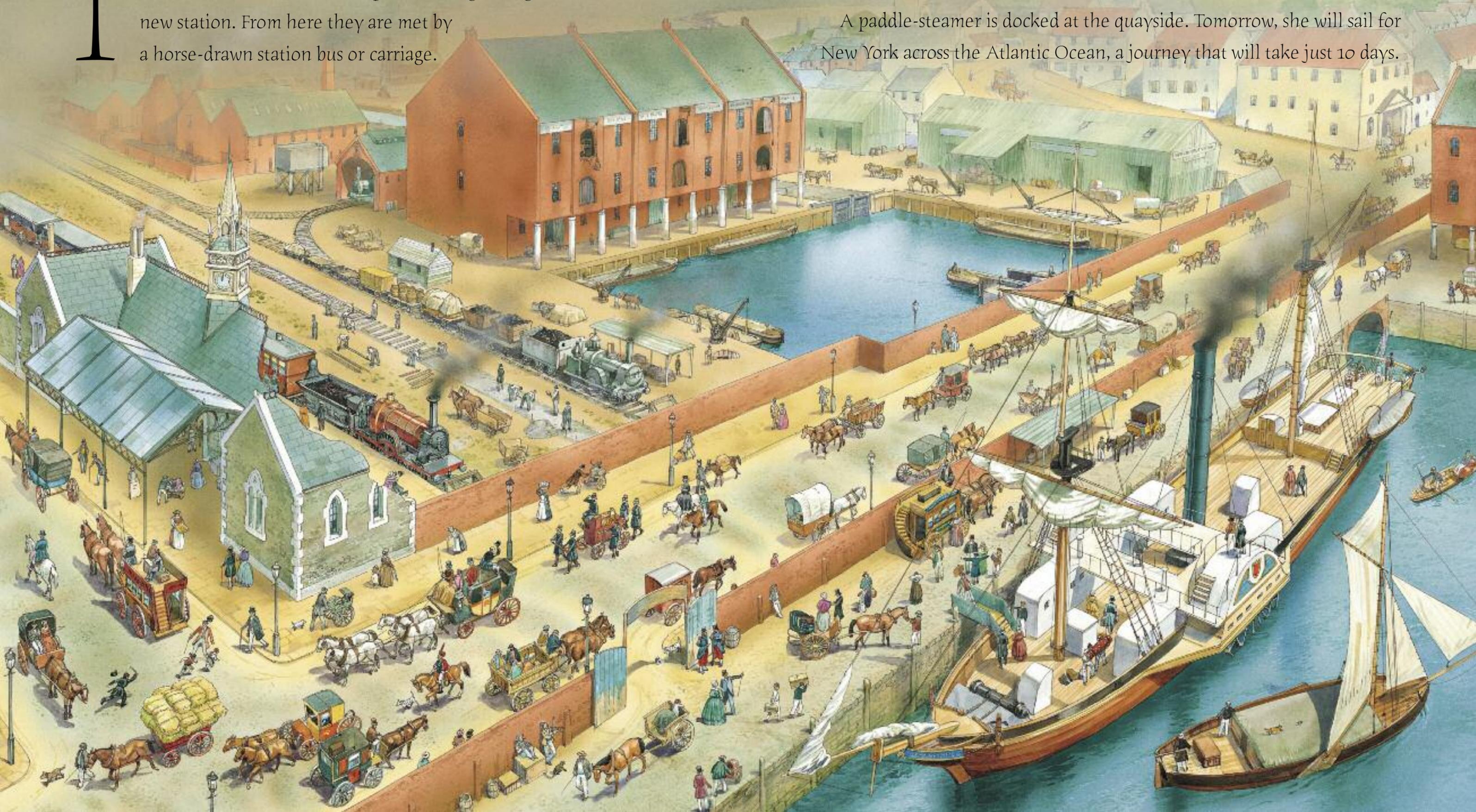
Some heavy goods are loaded on to barges for transport by canal. Barges can pull a load many times heavier than a horse can on land. A canal basin, where barges can moor along the quay, has recently been built.



Twenty-five years later, a railway, complete with steam locomotives, has come to the port. Passengers alight at the new station. From here they are met by a horse-drawn station bus or carriage.

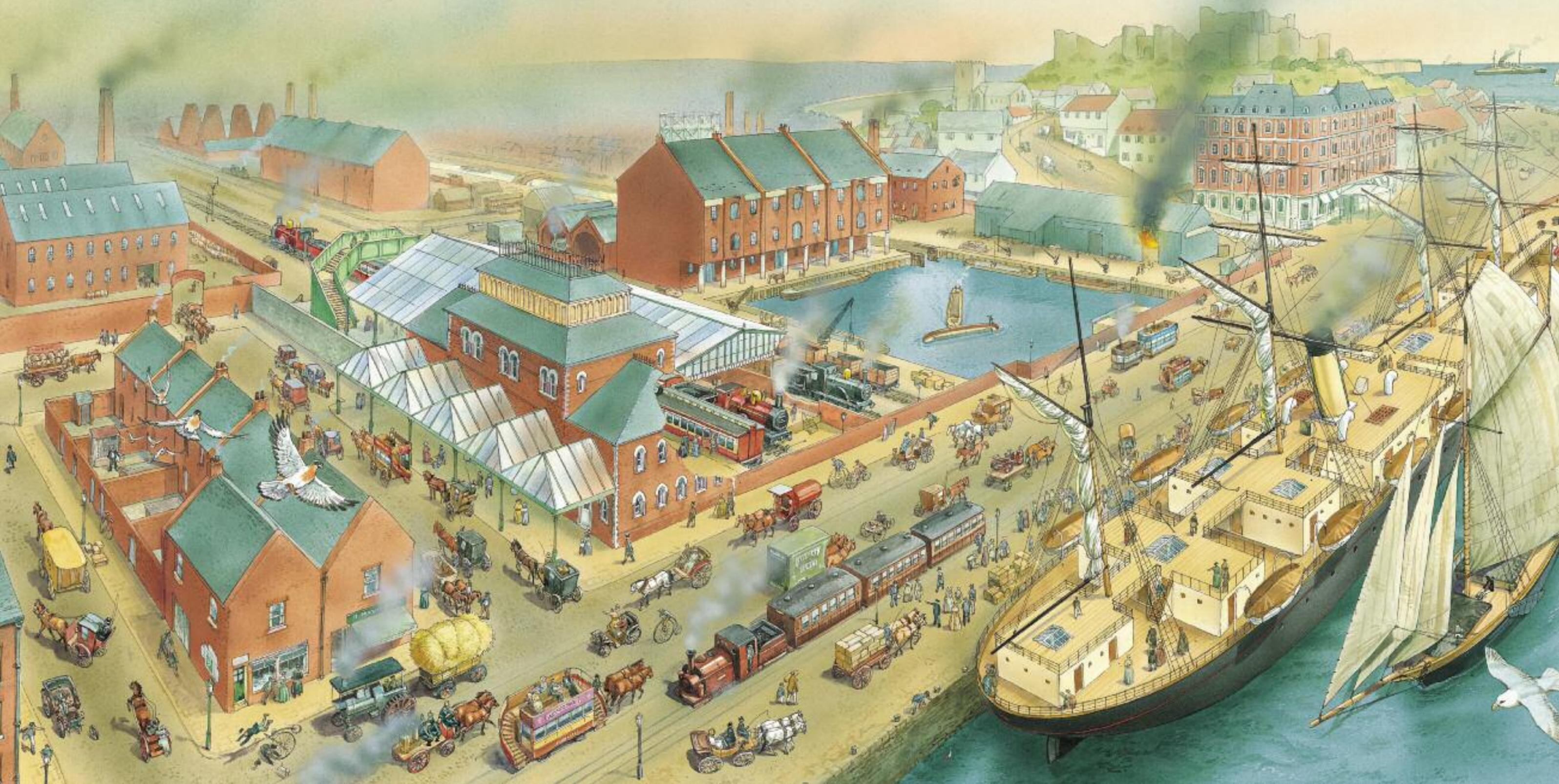
The streets are busy with all kinds of traffic, including carts, ladies and gentlemen on horseback, and a hand-pulled fire engine.

A paddle-steamer is docked at the quayside. Tomorrow, she will sail for New York across the Atlantic Ocean, a journey that will take just 10 days.



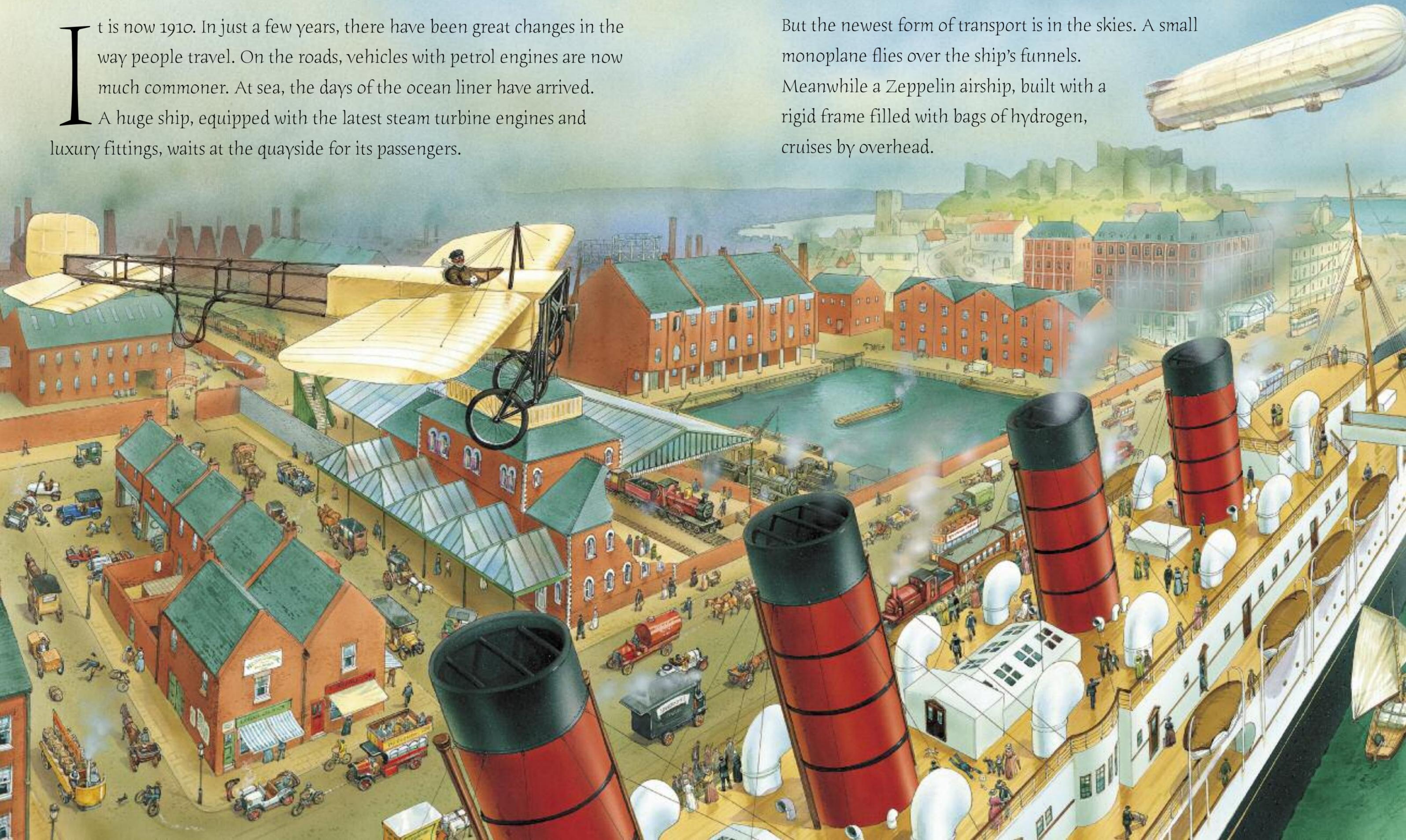
By the year 1895, the station has been enlarged to handle the increased railway traffic. Goods from nearby factories, cargo ships and the canal are loaded on to freight trains. A quayside railway carries people right up to the steamships that dock alongside.

Among all the various horse-drawn vehicles, the occasional steam-powered bus and numerous bicycles (including the Penny Farthing, with its enormous front wheel and tiny rear wheel) running along the busy streets are just a few jerky, noisy, petrol-driven cars.



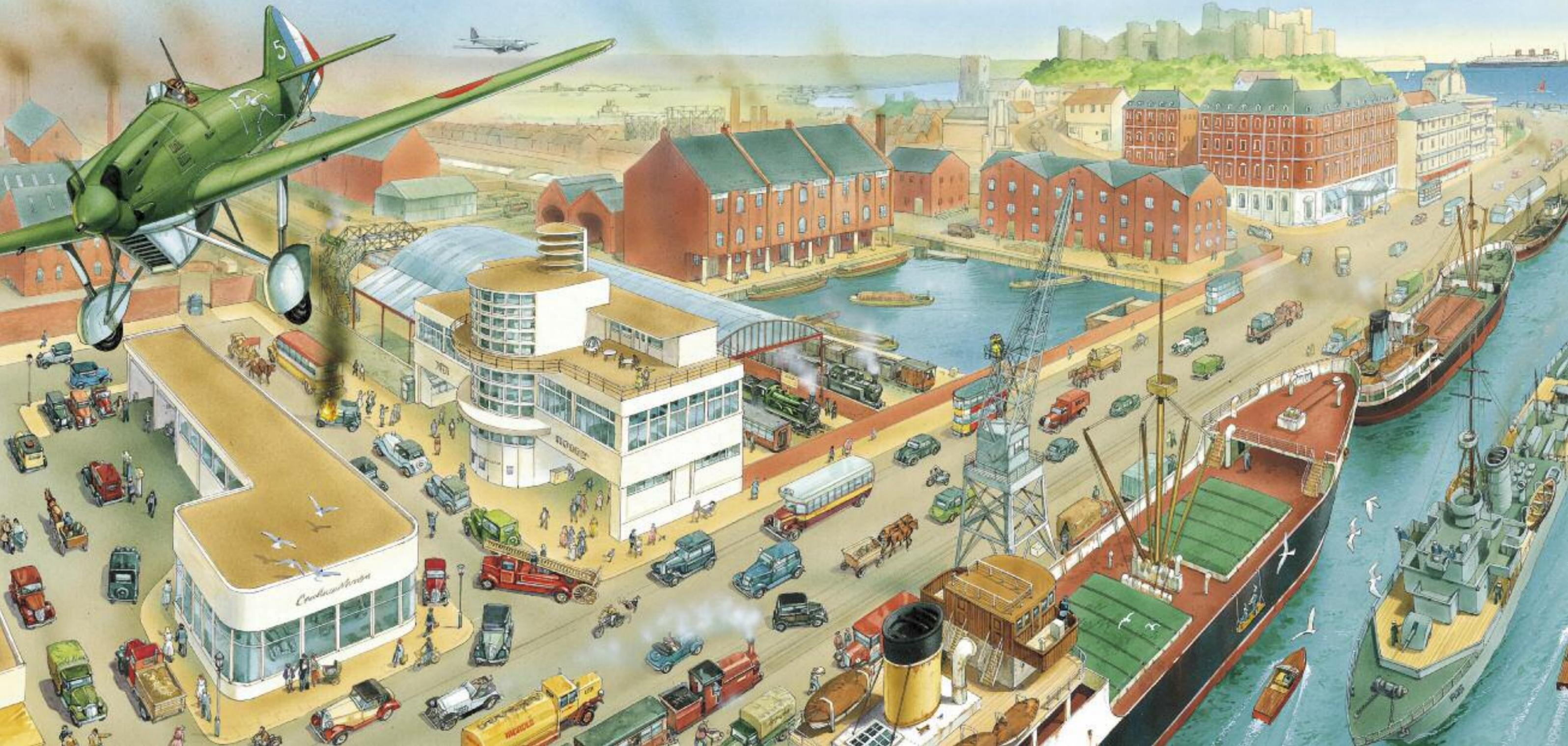
It is now 1910. In just a few years, there have been great changes in the way people travel. On the roads, vehicles with petrol engines are now much commoner. At sea, the days of the ocean liner have arrived. A huge ship, equipped with the latest steam turbine engines and luxury fittings, waits at the quayside for its passengers.

But the newest form of transport is in the skies. A small monoplane flies over the ship's funnels. Meanwhile a Zeppelin airship, built with a rigid frame filled with bags of hydrogen, cruises by overhead.



Twenty-five years later, cars and coaches fill the busy streets of the city. Lorries unload or pick up goods from the ships moored at the quay. Trams run along rails set into the road. Taxis and coaches wait outside the station for passengers. A petrol station does brisk business.

New kinds of aircraft fly overhead. A fighter, much faster and more agile than the early monoplane, speeds by. There is also an airliner, designed to carry mail and 20 or 30 passengers over long distances.



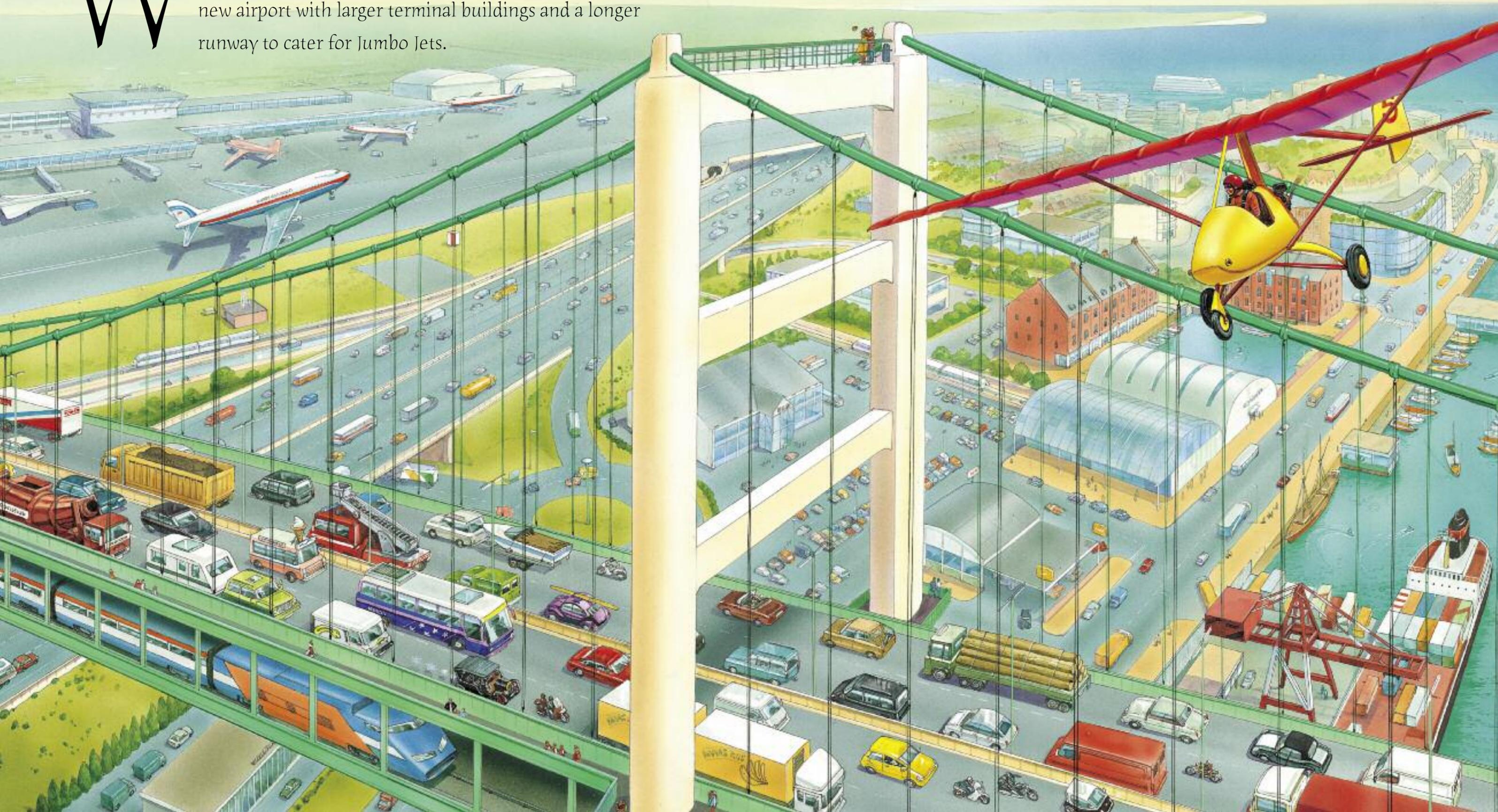
Air traffic has grown hugely since the end of World War II. Now it is 1958. An airport has been built outside the city and airliners take off from its long runway. Some airliners carry 70 passengers at speeds of 500 kilometres per hour.

Road traffic has also increased and dual carriageway roads have been built. Roundabouts, flyovers, petrol stations and service areas also appear. Most trains are now diesel or electric powered.



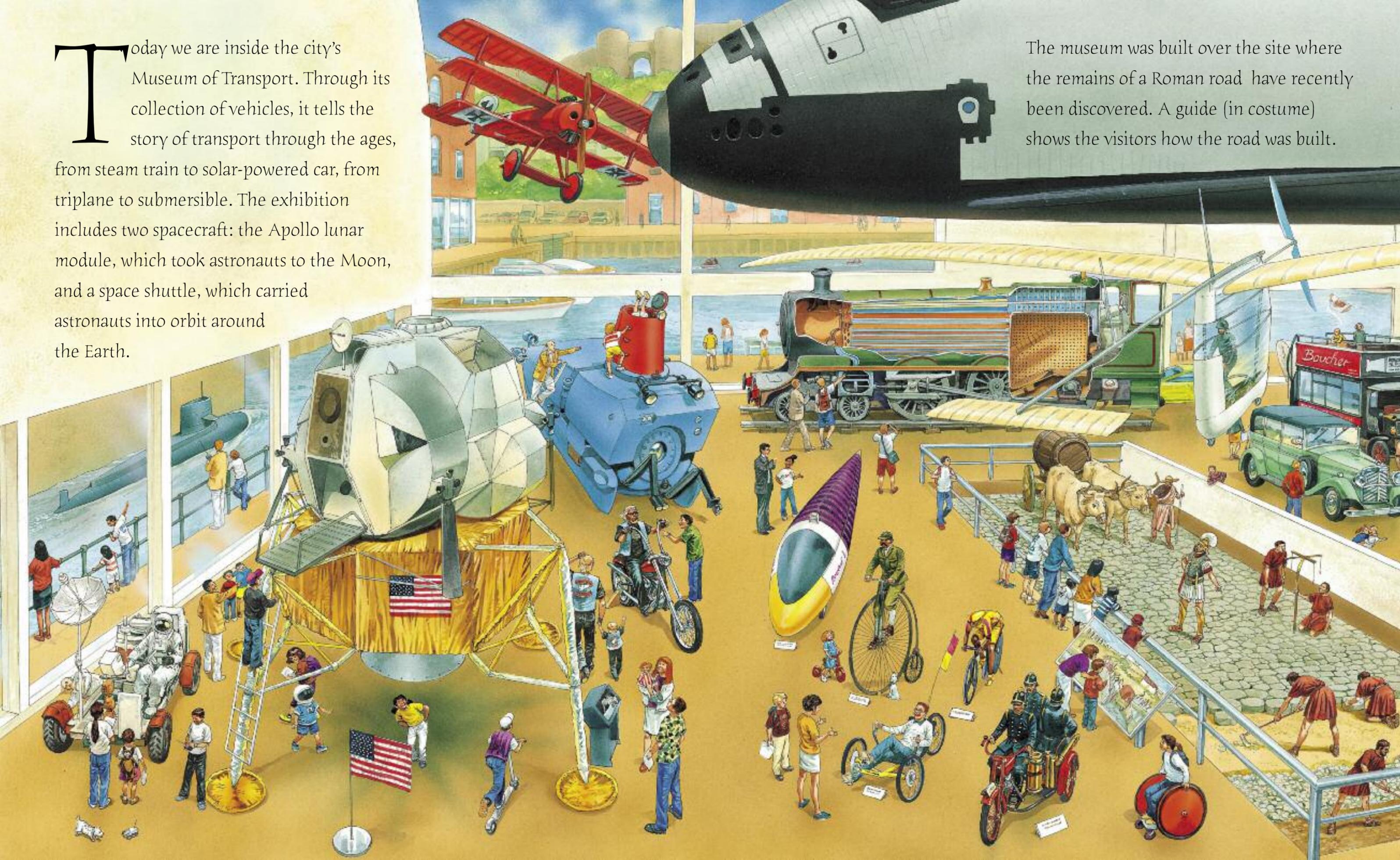
We have reached the year 2000. A suspension bridge carries both road vehicles and high-speed trains. There is also a new airport with larger terminal buildings and a longer runway to cater for Jumbo Jets.

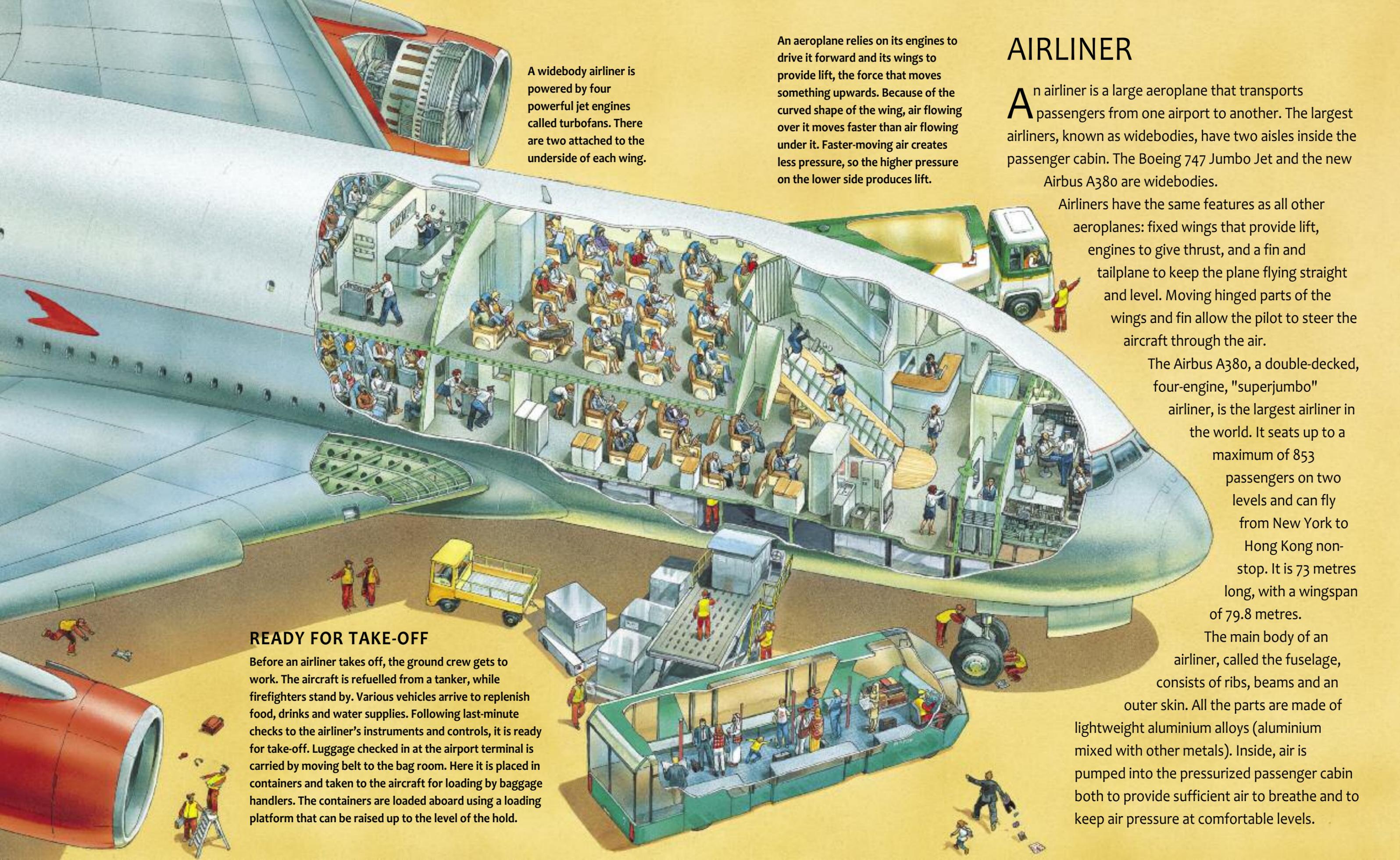
A shuttle rail link carries passengers between the city and the airport. Ships in the docks load containers straight from lorries into their holds.



Today we are inside the city's Museum of Transport. Through its collection of vehicles, it tells the story of transport through the ages, from steam train to solar-powered car, from triplane to submersible. The exhibition includes two spacecraft: the Apollo lunar module, which took astronauts to the Moon, and a space shuttle, which carried astronauts into orbit around the Earth.

The museum was built over the site where the remains of a Roman road have recently been discovered. A guide (in costume) shows the visitors how the road was built.





A widebody airliner is powered by four powerful jet engines called turbofans. There are two attached to the underside of each wing.

An aeroplane relies on its engines to drive it forward and its wings to provide lift, the force that moves something upwards. Because of the curved shape of the wing, air flowing over it moves faster than air flowing under it. Faster-moving air creates less pressure, so the higher pressure on the lower side produces lift.

AIRLINER

An airliner is a large aeroplane that transports passengers from one airport to another. The largest airliners, known as widebodies, have two aisles inside the passenger cabin. The Boeing 747 Jumbo Jet and the new Airbus A380 are widebodies.

Airliners have the same features as all other aeroplanes: fixed wings that provide lift, engines to give thrust, and a fin and tailplane to keep the plane flying straight and level. Moving hinged parts of the wings and fin allow the pilot to steer the aircraft through the air.

The Airbus A380, a double-decked, four-engine, "superjumbo" airliner, is the largest airliner in the world. It seats up to a maximum of 853 passengers on two levels and can fly from New York to Hong Kong non-stop. It is 73 metres long, with a wingspan of 79.8 metres.

The main body of an airliner, called the fuselage, consists of ribs, beams and an outer skin. All the parts are made of lightweight aluminium alloys (aluminium mixed with other metals). Inside, air is pumped into the pressurized passenger cabin both to provide sufficient air to breathe and to keep air pressure at comfortable levels.

READY FOR TAKE-OFF

Before an airliner takes off, the ground crew gets to work. The aircraft is refuelled from a tanker, while firefighters stand by. Various vehicles arrive to replenish food, drinks and water supplies. Following last-minute checks to the airliner's instruments and controls, it is ready for take-off. Luggage checked in at the airport terminal is carried by moving belt to the bag room. Here it is placed in containers and taken to the aircraft for loading by baggage handlers. The containers are loaded aboard using a loading platform that can be raised up to the level of the hold.

GLOSSARY

Aqueduct A bridge that carries water.

Cargo A ship's freight or load.

Container port A large port where container ships, with their load in sealed containers, load and unload.

Dual carriageway A road with two lanes for traffic in each direction.

Ferry A boat for transporting passengers and vehicles across a stretch of water.

Flyover A raised section of road allowing it to cross another without junctions.

Jet A high-speed aeroplane powered by a jet engine.

Lock A device for raising and lowering a boat at the point at which the water level changes on a canal.

Locomotive A railway engine.

Lunar module The part of a spacecraft used in the last stage of the journey to land on the moon.

Microlight A hang glider with an engine-driven propeller attached. It is light and easy to manoeuvre.

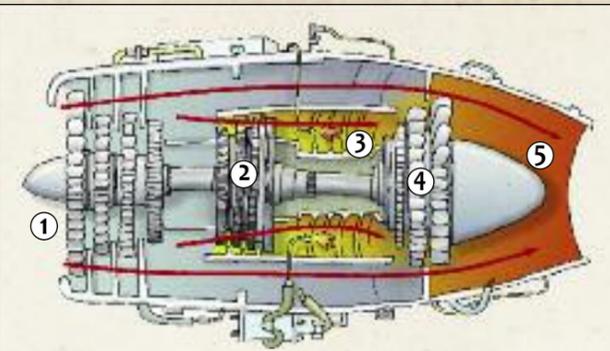
Monoplane An aeroplane with a single set of wings.

Paddle steamer A ship powered by a steam engine which turns paddle wheels to move the ship along.

Recumbent bicycle
A two-wheeled cycle which the rider pedals from a seated position with legs outstretched, pushing forward on the pedals.

Rocket A vehicle propelled by an engine that creates a stream of hot gases by burning fuel in a chamber.

In a rocket engine, different fuels mix and react together inside a combustion chamber. Hot gases are created, and they rush out of a nozzle at high speed. The engine, and the spacecraft, are pushed in the opposite direction.



JET ENGINE

Airliners are driven by powerful jet engines called turbofans. Air is sucked into the engine by a fan (1). Some of it is compressed by spinning blades (2) and mixed with kerosene fuel. The mixture is then ignited in a combustion chamber (3). The hot exhaust gases escape at speed through the rear of the engine, turning a turbine (4) which drives the compressor. The rest of the sucked-in air is ducted around the combustion chamber and joins the exhaust gases (5). The backward-flowing air provides a forward thrust for the aircraft.

INTERNAL COMBUSTION ENGINE

The internal combustion engine is so-called because fuel, usually either petrol or diesel, is burned (combusted) inside it. Fuel is turned into a fine spray and mixed with air. Inlet valves (1) let the fuel/air mixture into the engine's cylinders (2) where it is ignited by electric spark plugs. The resulting explosions drive the pistons (3) inside the cylinders down. The crankshaft (4) turns this motion into a turning motion. The crankshaft is connected to the wheels (or a propeller) via gears.

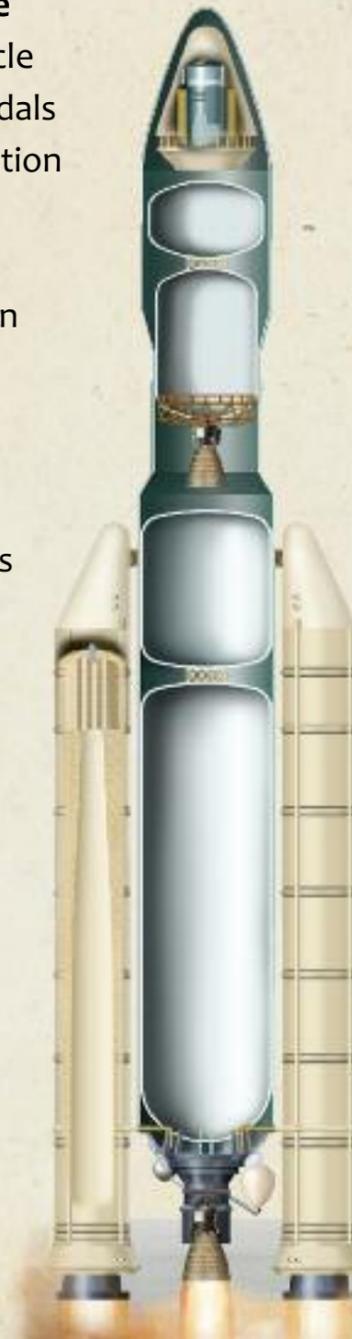
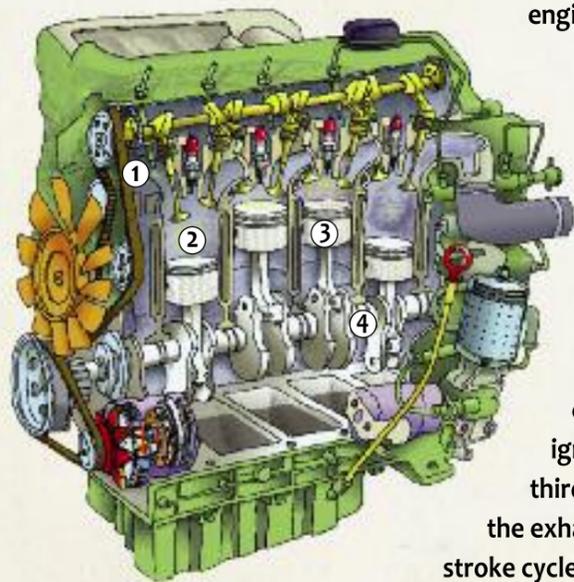
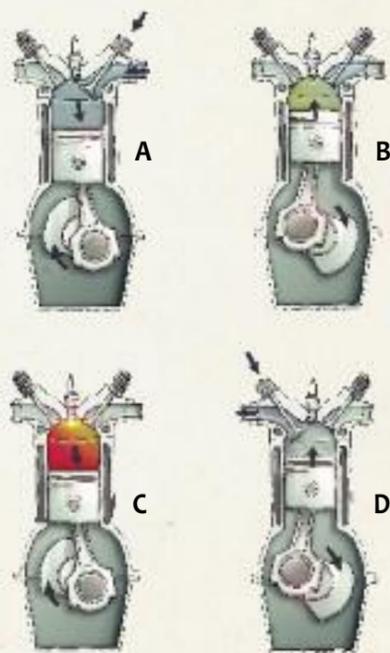
Most internal combustion

engines work on a four-stroke cycle (right).

On the first stroke (A), the piston moves down and the inlet valve opens.

A mixture of fuel and air is sucked into the cylinder. The fuel/air mixture is squeezed when the piston completes its second stroke (B). At that moment, a spark ignites it. The explosion forces the piston down again: the third stroke (C). As the piston rises on the fourth stroke (D),

the exhaust valve opens to let out the waste gases. The four-stroke cycle is repeated as the pistons move up and down.



Satellite A spacecraft that orbits the Earth.

Screw propeller A propeller shaped like a large wood screw which drives a vessel through the water.

Stagecoach A passenger coach that runs regularly from one resting place on a journey to the next.

Submarine A vessel that can travel submerged under the water.

Submersible A miniature submarine, mostly used for research in deep oceans.

Triplane An early plane with three sets of wings.

