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Evolution of Land Transport

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There is no doubt that necessity is the mother of invention, and all inventions and discoveries appear because of problems needed to be solved.

The automobile as we know it today was not invented in a single day by a single inventor. Many people or teams of people are credited with inventing the car.

It all started with the invention of the wheel in 4000-3500 BC. And it caused the appearance of the very first vehicle - a wheeled cart [3]. In medieval Europe, riding in a wheeled cart ceases to be prestigious for a noble person. The wheeled carriage is once again spreading among the upper classes of society in the Renaissance. In the XVI century, riding in carriages became fashionable. With the industrial revolution, the wheeled cart is gradually being replaced by new types of transport - rail, road, etc. In the Middle Ages, most of the discoveries were made in the field of maritime transport.

In 1662, the first public passenger transport route opened in Paris, which has a regular route, schedule and fare system. In 1672, Ferdinand Verbist built the first prototype car as a toy for the Chinese emperor. In the description of his toy, Verbist first mentioned the term "motor". The car was small in size and could not accommodate passengers, but it may have been the first working steam transport.

In 1769, the French inventor Cugnot tested the first model of a steam-powered machine, known as the «Cugnot small cart» and in 1770, the «Cugnot large cart». In 1789, the

American design engineer Oliver Evans received the first patent for an automobile in the United States, which is the first amphibious vehicle.

The first quite successful experiment in the construction and operation of a steam locomotive was conducted by R. Trevithick in 1803-1804. In 1808, to popularize his idea, Trevithick created an experimental attraction ring road in London, along which a steam locomotive moved at a speed of 15-20 miles/h. In 1815, the Czech mechanic I. Bozhek built a steam cart, which successfully passed the tests. It should be noted that experiments on the creation of such steam vehicles continued until the end of the XIX century. A very large contribution to the development of the idea of steam transport was made by D. Stephenson. On July 25, 1814, Stephenson tested his first steam locomotive, which carried a load of 30 tons at a speed of about 6 km/h. Some contribution to the development of steam transport was made by Murray, Blenkinsop, the Chapman brothers, Gaxworth, and others [2].

In the 18th and 19th centuries, many scientists and engineers contributed to the development of internal combustion engines. In 1791, John Barber invented the gas turbine. In 1794, Thomas Mead patented a gas engine. In the same year, Robert Street patented an internal combustion engine on liquid fuel and built a working prototype.

In 1799, the French engineer Philippe Lebon discovered lamp gas and obtained a patent for the use and method of producing lamp gas by dry distillation of wood or coal. In 1801, Lebon took out a patent for the design of a gas engine.

In 1807, the French engineer Nicéphore Niépce launched an experimental solid-fuel internal combustion engine (fuel-powdered pyreolophore). And that year the French inventor Francois Isaac de Rivaz built the first piston engine. The engine ran on hydrogen gas, having structural elements that have since been included in subsequent ICE prototypes: a

piston group and spark ignition. There was no crank mechanism in the engine design yet. In 1860, an amateur engineer, Etienne Lenoir, created an internal combustion engine powered by lamp gas. In 1862-1863, a gas-generating power plant with a capacity of up to 4 hp was installed on an eight-seat open omnibus.

The first motorcycle with an internal combustion engine was created in 1885 in Germany by German engineers Gottlieb Daimler and Wilhelm Maybach. On August 29, 1885, Gottlieb Daimler received a patent for a «vehicle with a gas or kerosene engine». From 1886-1896 gasoline-powered vehicles were patented, tested and produced by Karl Benz and Gottlieb Daimler (a three-wheeled vehicle with a stationary internal combustion engine, the first "crew with a motor" by Benz, Daimler's "mobile", the world's first bus, the first truck with a diesel engine and etc.) Since 1925, MAN has been producing the world's first series of diesel trucks. A year later, MAN released the world's first three-axle 6-ton diesel truck, the S1H6. In 1936, the world's first production passenger car with a Mercedes-Benz 260D diesel engine appeared [4].

In 1940, Oldsmobile released a car with the world's first automatic hydro-mechanical transmission (Hydramatic). Since 1997, the Japanese Toyota Corporation began production of the world's first mass-produced hybrid passenger car, the Toyota Prius, which is powered by both gasoline and electric engines. Its Hybrid vehicle drivetrain is built in such a way that allows both the gasoline engine and the electric motor to be directly connected to the driving wheels of the car and interact with each other.

In the 21st century, more and more new technologies are being introduced into all spheres of people's lives, which is reflected in the automotive industry. In 2001, monitor buses were introduced. Ionistors are capacitors with a double electric layer, which, in comparison with batteries, have the ability to

receive and release energy extremely quickly, while maintaining high efficiency. In 2004, the Shanghai Maglev, the fastest commercial maglev railway line, was launched, connecting Shanghai Metro station Longyang Lu to Pudong International Airport. Nissan LEAF is an electric car of the Japanese Nissan concern, mass-produced since the spring of 2010 and built on the new Nissan V platform. In November 2013, the Toyota Mirai, a hydrogen hybrid fuel — cell car, was first introduced to the public at the Tokyo Motor Show.

Based on the obtained material, we can conclude that there have been great changes in the field of transport, the evolution of transport from a wheeled cart to hydrogen hybrid cars. This process does not stand still, so it is difficult to predict the next steps of improving vehicles.

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