

The first railway line - genesis, pioneers, controversy

History of railways

29 stycznia 2021, Bydgoszcz

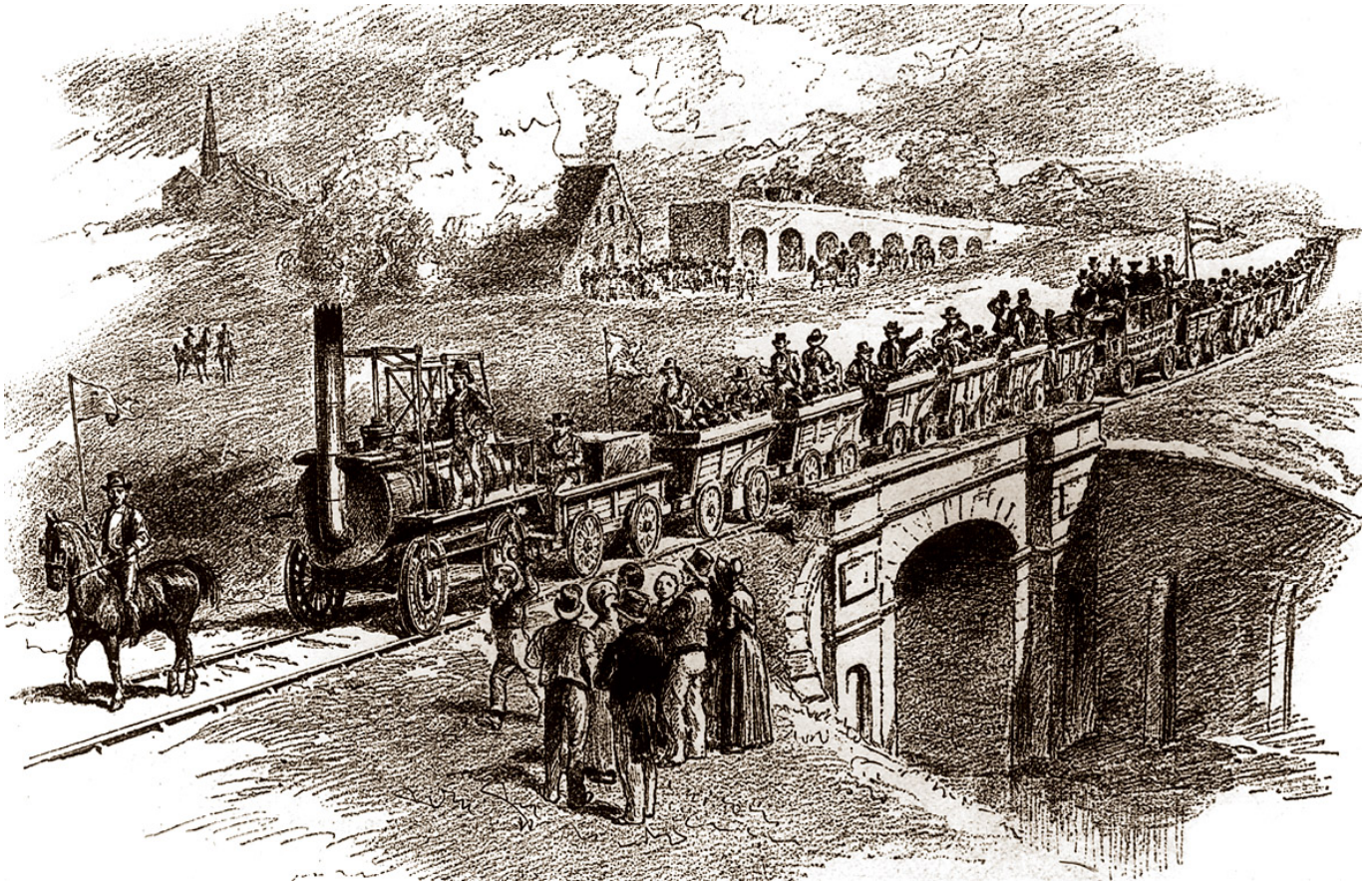
Railway took transport to a higher level of development. But before it conquered the world, habitual doubters, owners of horse and river transport companies needed to get used to the new invention, and in addition – meet the new technical challenges.

Horses paired with locomotives

With regard to high costs of transport of coal from the coal basin in Durham to Stockton-on-Tees, owners of local collieries were threatened with bankruptcy. Therefore, in 1821 they established a society for the construction of a horse-drawn railway to Stockton. Stephenson - a coal mine engineer and railway enthusiast- was appointed the person in charge whose task was also to use steam locomotives apart from horse traction. To ensure supplies for the new line, in 1824 Stephenson built the world's first steam locomotive factory in Newcastle. Another turning point was September 1825, when Stephenson completed the first steam locomotive for the new railway line. Originally, he called it "Active" (enlivened by energy), but later renamed it "Locomotion".

Locomotion means a steam engine

On 27 September 1825 the opening of a 12-mile-long (19 km) railway line from Stockton to Darlington was celebrated. The date is considered the symbolic date of the birth of the railway. Then, the first passenger car called "Experiment" was attached and carried dignitaries invited for the opening journey. Driven by Stephenson, "Locomotion", hauled an 80-ton load of coal and flour in 65 minutes, reaching a speed of 24 mph (39 km/h) at one of the sections.



The historic run of the "Locomotion" on the Stockton and Darlington route - September 27th 1825

Best tracks? - horizontal

In the course of construction of the Stockton and Darlington Railway, Stephenson noticed that even small elevations considerably reduced the speed of a steam locomotive, and slight slopes made primitive brakes useless. Thus, he came up with a conclusion that tracks should be laid on the flattest possible plane. He made use of this knowledge while working on the Bolton and Leigh Railway. To level the route of the train, he ordered a series of difficult cuts, embankments and stone viaducts.

Stephenson's success made the businessmen build a similar line from Manchester to Liverpool. In the first of these cities the textile and mining industry was successfully developing and the daily turnover of goods with the seaport in Liverpool exceeded 1,000 tons. Meanwhile, goods were transported in a traditional manner and, for example, it was faster to transport cotton from overseas than to carry it from Liverpool to the 35-mile (56 km) away Manchester.

Anti-railway campaign

Having heard about the railway construction project, owners of transport companies making use of the horse and river power unleashed a wide-scale anti-railway campaign involving the press. The matter was the subject of vigorous arguments in the English parliament. Numerous, quite absurd rumours were propagated, including rumours that the puffing and smoking vehicle would scare farm animals (the cows would stop giving milk and the hens would not lay eggs), kill forest animals, increase the number of miscarriages in women, smoke would obscure the sky making day a dark night, pose a risk of fire to houses and forestland, and if a steam locomotive was derailed, the boiler would explode killing thousands of people and sweeping the local buildings off the ground.

Therefore, when in 1826 Parliament was making great efforts to approve the project of the construction of the Manchester-Liverpool Railway Line, the inhabitants of the territory through

which the prospective route was to pass went into panic. There were even instances of dangerous riots and sometimes railway construction workers had to flee evading the inhabitants attacking them.

Competition for laurels

The best will get the contract for the line

In the face of numerous doubts, a competition to build the best locomotives to run on the new line was announced. Practical trials were organised in Rainhill on a special 1.7 mile (2.8 km) long track. Every locomotive was supposed to run ten times in front of the audience. Technical assessment was performed and time records were kept by a committee consisting of: John Kennedy, John Rastrick and Nicholas Wood – at that time notable railway experts. Members of the committee were to select the winner entitled to a prize of 500 sterling. But the prize was not the most important thing to the participants of the competition. The winner would be given a contract for the production and supply of locomotives for the new railway line under construction.

The engines taking part in the Rainhill Trials had to satisfy the following requirements for entry:

- they had to produce steam on their own
- they weighed less than 6.1 tons
- the pressure in the boiler could not exceed 3.5 atm
- they pulled a 20-ton train set over a specified distance, doing at least 10 mph (16 km/h)
- they had maximum 6 wheels
- their funnel was not taller than 4.5 metres
- the cost of construction of the steam locomotive could not exceed 550 sterling.

Finally, on the day of the competition, that is, 6 October 1829, five locomotives were entered:

“The Cycloped” built by Thomas Shaw Brandreth

“The Sans Pareil” built by Timothy Hackworth

“The Novelty” built by John Braithwaite and John Ericsson

“The Rocket” designed by George Stephenson

“The Perseverance” built by Timothy Burstall.



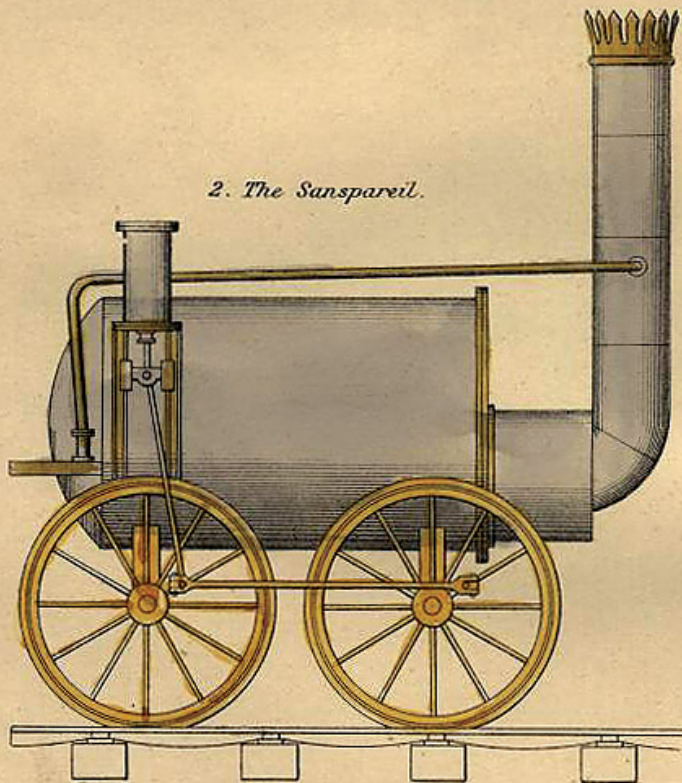
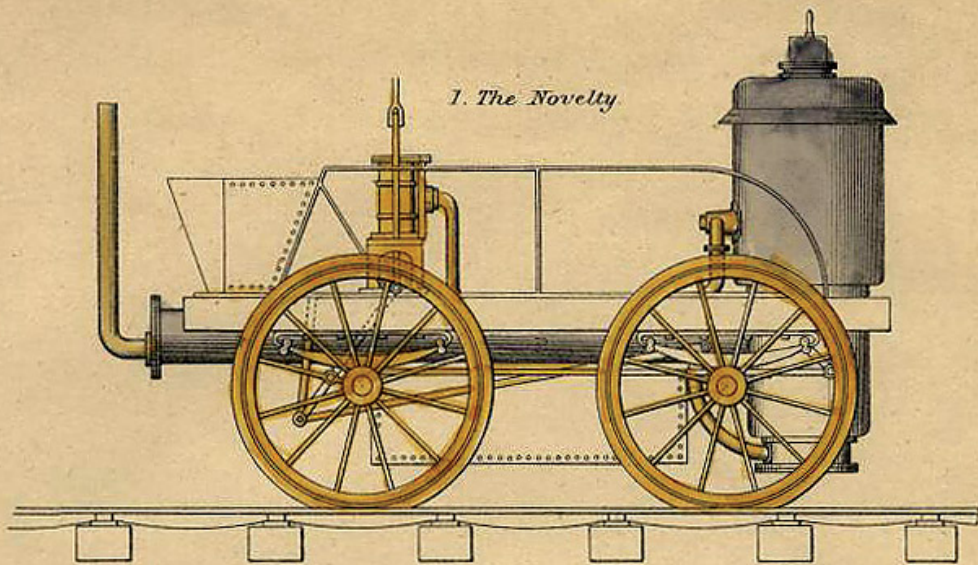
"Locomotion" by George Stephenson - one of the most famous steam locomotives

Unfair competition - a horse in a steam locomotive

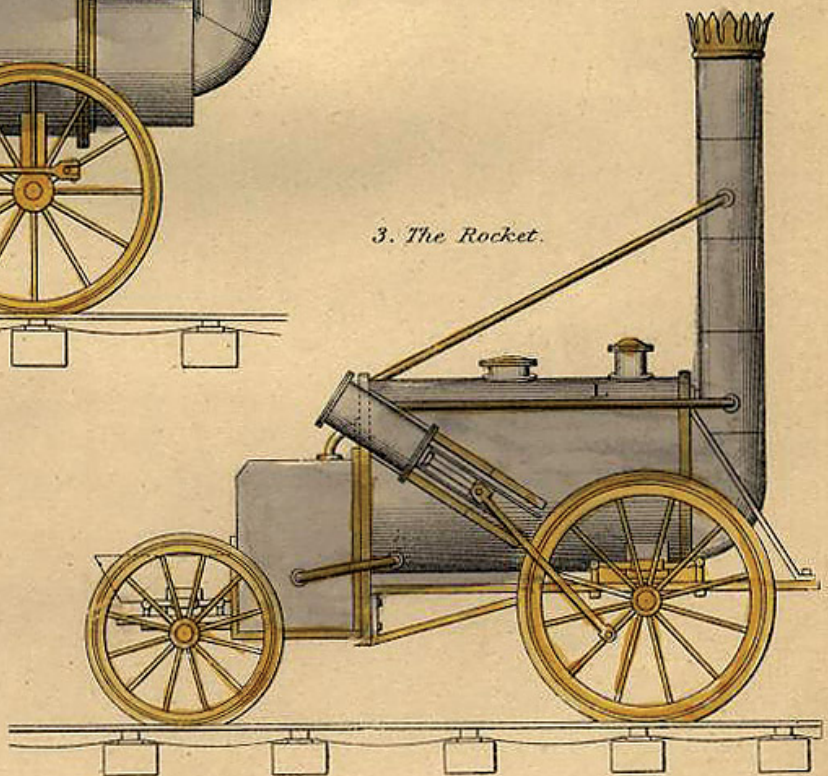
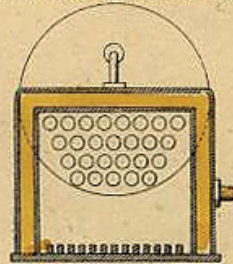
Two locomotives dropped out of the competition disqualified by the jury at entry. It turned out that inside the three-ton "Cycloped" there was a horse walking on a drive belt for power! In turn, the "Perseverance" burnt too much coal and did not meet the criteria of the competition (the designer was paid 25 sterling as a consolation prize). The "Sans Pareil" almost completed the trials although there were some doubts whether it could be entered in the competition as it was 300 pounds overweight. However, it did eventually complete eight trips before cracking a cylinder. After such serious damage, the designer did not manage to start the engine in a short time. Despite this failure, Hackworth's locomotive was purchased by the Liverpool and Manchester Railway where it served for 2 years before being leased to the Bolton and Leigh Railway.

The last drop-out from the competition was the "Novelty" which was too cutting-edge in 1829, lighter and considerably faster than the other locomotives in the competition. Without any doubt, it was the crowd's favourite. Unfortunately, having reached a then-astonishing speed of 28 mph (45 km/h) on the first day of the competition, it later suffered some damage to a boiler pipe which could not be properly fixed on site within the time allotted. The "Novelty" continued the runs on the following day but it reached 15 mph (24 km/h) only. It broke down again and was withdrawn from the competition.

LOCOMOTIVE.



4. Section of boiler and firebox.

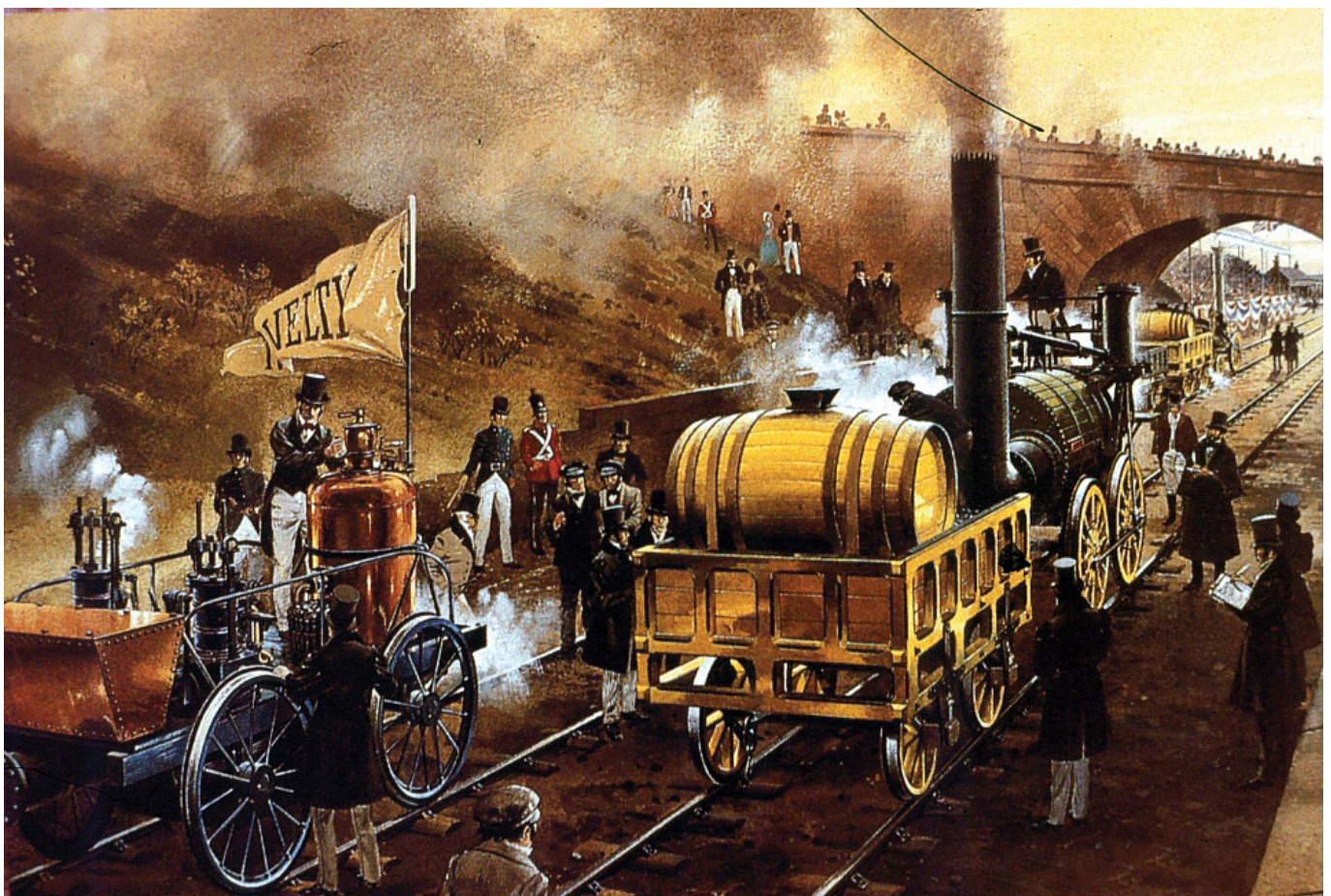


Three of the locomotives competing during the Rainhill trials: "The Novelty", "The Sanspareil" and the victorious "The Rocket"

The winner - Stephenson's "Rocket"

The only locomotive to overcome all adversities was the "Rocket". Stephenson attached a carriage with 30 passengers and completed the route reaching a top speed of 28 mph (45 km/h). The competitors of the "Rocket" failed during each trial. Stephenson received a prize of 500 sterling and was awarded a contract for the production of locomotives for the Liverpool and Manchester Railway.

George Stephenson, and later his son Robert, both had a sixth sense and unique skills in introducing innovations. Most technical innovations in the "Rocket" were only adaptations. The use of a multiple fire-tube boiler with the furnace surrounded by water, which enabled the "Rocket" to win the Rainhill Trials, can be quoted as an example. This ground-breaking invention was patented in February 1828 by Marc Séguin in France. Independently, in the United Kingdom, such a boiler was designed by Henry Booth, the Secretary of the Liverpool and Manchester Railway Company.



The illustration of the Rainhill Trials and the runs of the "Sans Pareil" and the "Novelty"

Steam locomotives -a new hit in transport

The competition, though only partially successful, demonstrated that steam locomotives could safely run at speeds unattainable for horse-drawn traction. It changed the opinion on both the engines and railway as a whole. Following this event, the initiatives concerning the construction of new railway lines were agreeably accepted by the authorities and the inhabitants. On the route between Liverpool and Manchester, for which the competition was organised, horse-drawn traction was never introduced. On 14 June 1830, a trial train set pulled by a locomotive named the "Arrow" travelled this route roughly in one and half an hour. This was the beginning of the real railway providing cargo and passenger transport services. The result of the competition was an answer to the question that had emerged before: should steam locomotives or perhaps animal power be used as the means of locomotion?



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