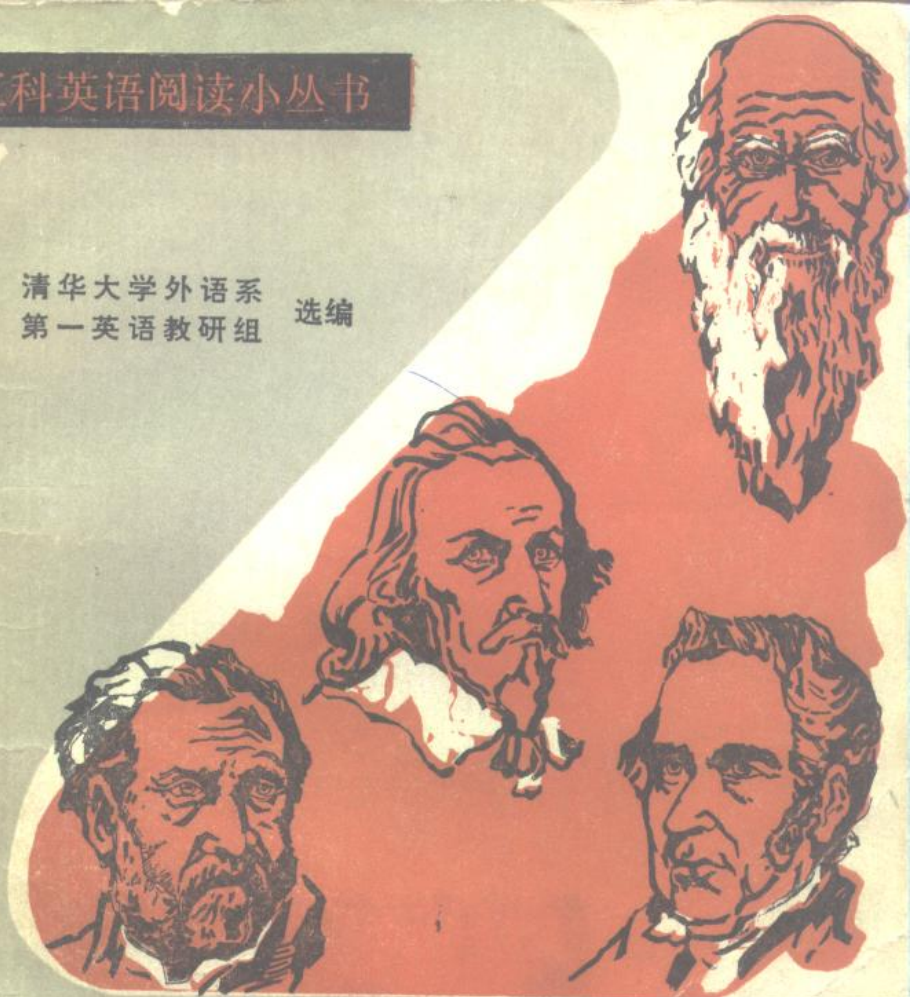


理工科英语阅读小丛书

清华大学外语系
第一英语教研组 选编



THE FAMOUS INVENTORS AND SCIENTISTS

著名发明家和科学家的故事

清华大学出版社

理工科英语阅读小丛书 (1)

**TEN FAMOUS INVENTORS
AND SCIENTISTS**

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内 容 提 要

本书第一集选编了欧美各国十位著名发明家和科学家的传略，概述他们的生平、研究活动以及所取得的成就。

文章由浅入深，文字流畅。适合中专及大学理工科学生阅读。也可供一般工程技术人员自学。书中难懂之处，酌作注释。书后附有总词汇表。

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前 言

在理工科大学的英语教学中，我们常常感到如何提高学生的阅读能力是一个不太容易解决的难题。现有的精读教材，由于篇幅和内容的限制，词汇量往往偏窄，各种语言现象的出现和重复受到极大的影响，这样就不利于培养学生的阅读能力。

学习外语必须通过实践，而阅读能力的培养和提高就更有必要通过大量的阅读实践；有了这种实践，才能积累和扩大词汇量，巩固已掌握的语言知识，并在此基础上进一步学习一些新的习惯表示法，从而提高阅读速度，增强理解力。为此我们编选了一套理工科大学生英语阅读小丛书。在选材方面尽量考虑到内容的知识性，科学性和趣味性；语言力求生动活泼，清新明快，简洁易懂。每本书后附有总词汇表，以利查阅和记忆。对疑难之处作了适量的注释。本丛书总共有十册。内容有传记、小品、科普文章，工程技术等方面的文章。

本丛书第一册由李相崇教授审阅。

参加第一册注释工作的有：徐君如，陈星辉，刘玉萍，周晏如，吴黛，金世恒，李瑞芳，徐琳钧等同志。

由于我们水平有限，时间紧迫，缺乏经验，缺点和错误在所难免。热切希望得到广大读者的批评和指正。

清华大学外语系
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1 George Stephenson¹

In 1781, in the North-East of England, life depended on the great coal mines, where half-naked men worked long hours in narrow, hot, underground tunnels to dig the coal which fed Britain's fires and her growing industries.

It was then, in Wylam, Northumberland, that George^⑤ Stephenson was born.² His father, Robert, worked on the new steam pumps which helped the mine owners to get more coal from underground. The pumps were quite a new invention, and a new class of men was needed to work them. Robert earned a little more than an ordinary miner, and was^⑩ respected for his abilities.

But the family were still miserably poor. His wages, at twelve shillings a week, did not stretch to providing education for their six children; and they all lived in one room of a tiny house near the coal-face. Neither Robert nor his wife^⑮ Mabel could read or write, and it looked as if their children would all be the same. Schools cost money and the Stephensons had little enough of that.

George Stephenson was their second child, a big strong lad who started work at the age of eight, earning twopence a^⑳ day for frightening cows away from the mine's wooden railway. Horses pulled wagons along a wooden track from the



"Now I am George Stephenson, gentleman, but under these clothes
I am still the same man."

mine to the river, where the coal was put into boats and sent away to London and to all the other big cities.

When he was ten, George got a job driving these horses—he loved horses all his life, and was a good rider—and later he got sixpence a day picking stones and rubbish out of ⑤ each load of coal before it started on its long journey. But the great day came when, at fourteen, George started work as his father's assistant on the pump, at a whole shilling a day.³

He was determined to understand pumping engines. He ⑩ spent all his free time working on his father's engine, taking it to pieces⁴ and putting it together again. He was eager to learn about all the machines in the mine, and he learned fast. At seventeen he was put in charge of⁵ a pump, with his father as his assistant. If a piece of machinery did not work, ⑮ the men always said, 'Call in⁶ Geordie Stephenson'. That way, he learned to work and mend the engine which moved the cage, with the miners in it, down from the surface to the coal-face. Then he moved on—to the disgust of the much older men who had worked it before—to being in charge of ⑳ the machine itself.⁷

At eighteen George was getting a pound a week—top pay in those days, and more than his father was earning. But he was ambitious and knew that, if he could not read or write, he could get no further. He did not want to read so that ㉓ he could enjoy the works of Jane Austen⁸ or Sir Walter Scott⁹; he just knew that there were easier ways of finding

about machines than taking them apart, and that was learning from books¹⁰.

So George started going to night school three nights a week. It cost him threepence a week. He practised his writing whenever he had a spare moment at work. At nineteen, he proudly wrote his own name.

He learned figures much more easily than words. Soon he was a good mathematician. He was never really comfortable with writing, however. His letters are full of life and interest, but his spelling is strange and he seems never to have heard of full stops. Later, when he could afford it, he liked to employ an assistant to write his letters for him.

In 1802 he decided to look for a wife. His first choice was a farmer's daughter called Betty Hindmarsh. But her father did not want her to marry a common 'engine-man', so George married Fanny Henderson, who was twelve years older than he was. They moved to a tiny house at Willington Quay, where George was in charge of the big winding engine¹¹. Their only son, Robert, was born there the next year.

George spent his free time mending clocks and practising his reading and writing. Most miners spent theirs¹² less quietly, in drinking, or watching prize-fights¹³. George was ambitious. He wanted to do better for himself, and he was sure that much could be done with steam engines. He was sure that steam engines, placed beside steep bits of the wooden railway lines, could pull the coal wagons up the hill and let them roll down the other side by themselves. On the level,

horses could still the wagons.

In 1804 the Stephensons moved to Killingworth, where George found another, even better, job working with engines. Here Fanny gave birth to¹⁴ a daughter, but soon both mother and child were dead and George was left with little^⑤ Robert to bring up¹⁵. His sister Nelly came to look after¹⁶ them both. Meanwhile George's father had had a bad accident and became blind. In those days, if you could not work you did not eat. George moved his parents to Killingworth and supported them until they died. ^⑩

The mine owners had noticed George's cleverness with machines. There was one particular expensive pumping machine in a new and expensive mine. Nobody could make it work. 'Send for¹⁷ Geordie', said the workmen. 'He'll make it work.' And, when he was asked, George agreed, as long as¹⁸^⑮ he could choose his own workmen. The men at the mine, who were older and had more experience than George, were not pleased, but the owners let George have his own way¹⁹. For three days and nights George and his men worked on that pump. They took it to pieces, cleaned every part and put it^{②①} together again. And they got it working. They pumped the water out of the tunnel, and men could dig coal there for the first time. The owners gave George ten pounds and promised to remember his good work.

They kept their promise²⁰. By 1812, at the age of^{②⑤} thirty-one, he was engineer in charge of all the machines, at a hundred pounds a year. The extra money made it²¹ possible

for him to educate young Robert. He wanted his son to have the advantages his father had never had.

Robert went to a private school five miles away, and George provided him with a horse to carry him and his many ⑤books to and from school. Together they studied science. Robert, who was a better reader than his father, read the lessons out loud. Then father and son discussed the details together. Then they would try the experiments.

When they had learnt all the science the school could ⑩teach them, George paid three pounds a year for Robert to join the Literary and Philosophical Society²². The people there, seeing how enthusiastic young Robert was, helped by lending him books and other things. And, of course, George learned from these too. Father and son were good for each ⑮other. Robert was able to help with the book work, and George helped him to put it into practice.

While George was earning his hundred pounds a year at Killingworth, he was doing other work in his free time. He invented some engines for underground work, which meant ⑳that the mine needed only fifteen horses instead of²³ a hundred. This suited George. He loved horses, and he liked to think he had made their lives easier.

He was always inventing something. He built a machine in his garden for frightening the birds away. Its arms flew ㉕round and round²⁴, and it did a good job of frightening the neighbours too. He invented a way of locking his house door so that he could open it but nobody else could. He invented a

lamp which burned under water, and used it for catching fish at night. His house was always full of finished and half-finished models and inventions.

George was becoming well-known as a clever practical engineer, with plenty of character. At the same time, he was^⑤ very much like other working men, with his strong Northumbrian²⁵ (or 'Geordie', as it is called in the north) accent. He loved to take part in trials of strength—such as throwing hammers and lifting weights—with his workmen, who loved him for it. ⑩

When Rebert left school at fifteen, to study under a fine engineer called Nicholas Wood, George's sister Nelly got married. It seemed as if she waited until the lad no longer needed her. This left George alone, but not for very long. Betty Hindmarsh, whose father had not allowed her to marry^⑬ George all those years ago²⁶, had never been attracted to any other man. Now she and George were married, and they were very happy together. And how could Farmer Hindmarsh disapprove of²⁷ her marrying an engineer whose pay had just been increased to two hundred pounds a year? ⑮

George is known for his work with steam locomotives, but it is not generally known that he invented a useful miner's lamp, which was used in the North of England for many years.

If you mention 'miner's safety lamp' to any British^⑳ schoolboy, he will say 'Sir Humphry Davy'²⁸. Davy was one of the great scientists of the day. The mine owners called

him in to help with a problem--gas in the mines, or 'fire-damp', as the miners called it. This gas often exploded, causing many deaths. Sir Humphry produced a safety lamp, which gave light without danger of exploding, and the 'Davy
⑤lamp' earned him a place in history.

But was his lamp the first? The people around Killingworth are sure that George Stephenson had already made one. At the same time as Davy was at work in London, George Stephenson was studying the gas problem at Killingworth. And the lamp he made worked in exactly the same way as Davy's did.

On 5 December, 1815, his invention was shown in public²⁹ to the Literary and Philosophical Society. George was too nervous to speak about his lamp in public, and he got his
⑩friend Nicholas Wood to speak for him. Soon, however, he decided that Nicholas was not getting the description quite right, and spoke himself. His speech was a great success, Geordie accent and all³⁰. The 'Geordie lamp' was soon being recommended for use in mines all over the North.

⑫ Meanwhile the Davy lamp became famous further south, and Davy got a prize of two thousand pounds for it. The people in the North were annoyed about this, and fought to get 'their' lamp recognised too. At last George received a thousand pounds and a silver cup, but by this time he had
⑮almost forgotten about his invention. He was giving all his attention to the problems of locomotives.

We often forget that railways, in George's day, were

nothing new. In very early times some bright person discovered that a horse which could pull one wagon on a road could pull several along rails. This knowledge was used mostly in the mining industry. At first the rails were wooden, then iron. Some railway used slopes—the power^⑤ from a line of loaded wagons running downhill could send a line of empty ones up a slope to be filled again.

By the time George was a man, steam engines were a common sight in mines. But they did not travel along the lines themselves; they were fixed in one place and provided^⑩ the power to move other things. Earlier in the century Trevithick³¹ had invented a locomotive—a steam engine which moved under its own power—but it was useless because it tore up³² the rails it ran on. The rails had to be improved before it was any use. ^⑮

This was the situation when George Stephenson built his first model at Killingworth. It was ready in 1814. And it worked. It pulled eight full wagons at a time, and it was named *Blucher*, after a famous soldier. Its first driver was George's brother James. *Blucher* sometimes slowed down³³^⑳ on her trips up and down the line. When this happened, James shouted for his big, strong wife, Jinnie, in their little house beside the track: 'Come away,³⁴ Jinnie, and give us a push!'

Jinnie put her shoulder to the wheel and pushed, and then^㉕ went back to her work. She must have been a busy woman. She had to get up at four to light the fire in *Blucher's* engine

and get the steam going.

Soon two more locomotives joined *Blucher: Wellington* (named after another great soldier) and *My Lord* (after Lord Ravensworth, one of the mine owners). At the same time
⑤ George worked to develop better rails. He spent two days a week at a factory where he and his friend William Losh hammered out a strong cast-iron rail. Soon the whole Killingworth track had cast-iron rails, and other mines wanted them too. George and Losh made a large profit out of them.

⑩ Over the next few years George built sixteen locomotives at Killingworth. Soon engineers came from all over the country to see them and watch the way they worked.

But we must remember that these were not passenger trains. They were lines of coal wagons. No one had ever
⑮ dreamt of³⁵ passenger trains pulled by locomotives ... until, in 1820, a man called Thomas Gray expressed his ideas on the subject in a book. He even drew a 'Railway Map of Britain' which is very like the map we have today. Railways, Gray felt, would mean less cruelty to horses. Coach horses suffer-
⑳ ed a lot in those days; one horse died for every two hundred miles of coach travel. Rail travel would be cheaper than coach travel too, said Gray. Soon even poor people would be able to afford to travel about the country.

Gray's ideas were good, but he did not know anything
㉕ about practical engineering. Happily, someone else did, and that was George Stephenson. A rich businessman called Edward Pease took a look at Gray's book, and wondered if

railways could be useful to him, too. He wanted a cheap way of getting coal from the mines near Darlington, to Stockton on the river Tees, where it could be put into boats. He and six other businessmen started the Stockton and Darlington Railway Company, and managed to get an Act of Parliament passed³⁸ to allow them to build a railway.

It is clear that, at least in the beginning they meant to use horse to pull the wagons. But then they met Stephenson.

George soon changed their minds about the horses by proving how much cheaper steam locomotives would be. Soon¹⁰ the Act was changed to allow this. And George became engineer to the new company at six hundred pounds a year.

First he had to solve the problem of the rails. Although he and Losh had produced good cast-iron rails, George found some new rolled-iron rails which he thought were even better. He lost money by doing this, but he believed that it was important to have the best from the very beginning.

Then he had to choose the gauge for his railway—the distance between his rails. He chose four foot eight-and-a-half inches, and that has remained the gauge to this day.²⁰ Exactly why it was four foot eight-and-a-half and not five foot, or four foot six, is a mystery.

On 23 May, 1822 the head of the company, Mr Meynell, laid the first rail, while bells rang and music was played. But we have no report of what Mr Meynell thought on that⁵ exciting day, for the simple reason that he did not like making speeches and refused to make one. A small boy made

an easy profit in the streets of Stockton, shouting, 'Speech of Mr Meynell! One penny!' Those who bought it found that it was an empty sheet of paper.

Three hundred workmen walked behind Mr Meynell, ⑤carrying their tools. These were the navvies (the word is a short form of navigator, or sailor). They, and others like them, built the railways we know today. Many of their leaders had been chosen by George Stephenson himself. For many years afterward, navvies who had worked on the Stock- ⑩ton and Darlington line turned up³⁷ all over Europe, building one new railway line after another. The more ambitious of them became railway engineers themselves, for there was room for men of ability.

Navvies, not machines, built the railways. They moved ⑮the earth and dug the tunnels. With simple tools, a few horses, a little gunpowder and their own strong bodies, they moved mountains.

Many rich and powerful men tried to prevent the building of the new railway line. Some thought steam locomotives ⑳were dangerous. Others just did not want them anywhere near their own property. The company had to pay out a lot of money to people for permission to cross their land. But at last it was all decided, and Robert, now aged nineteen and already a clever engineer, took over the engine factory at ㉓Newcastle³⁸ where the two new locomotives, *Locomotion* and *Hope*, were to be built. George and Betty moved there too, to keep an eye on³⁹ things.