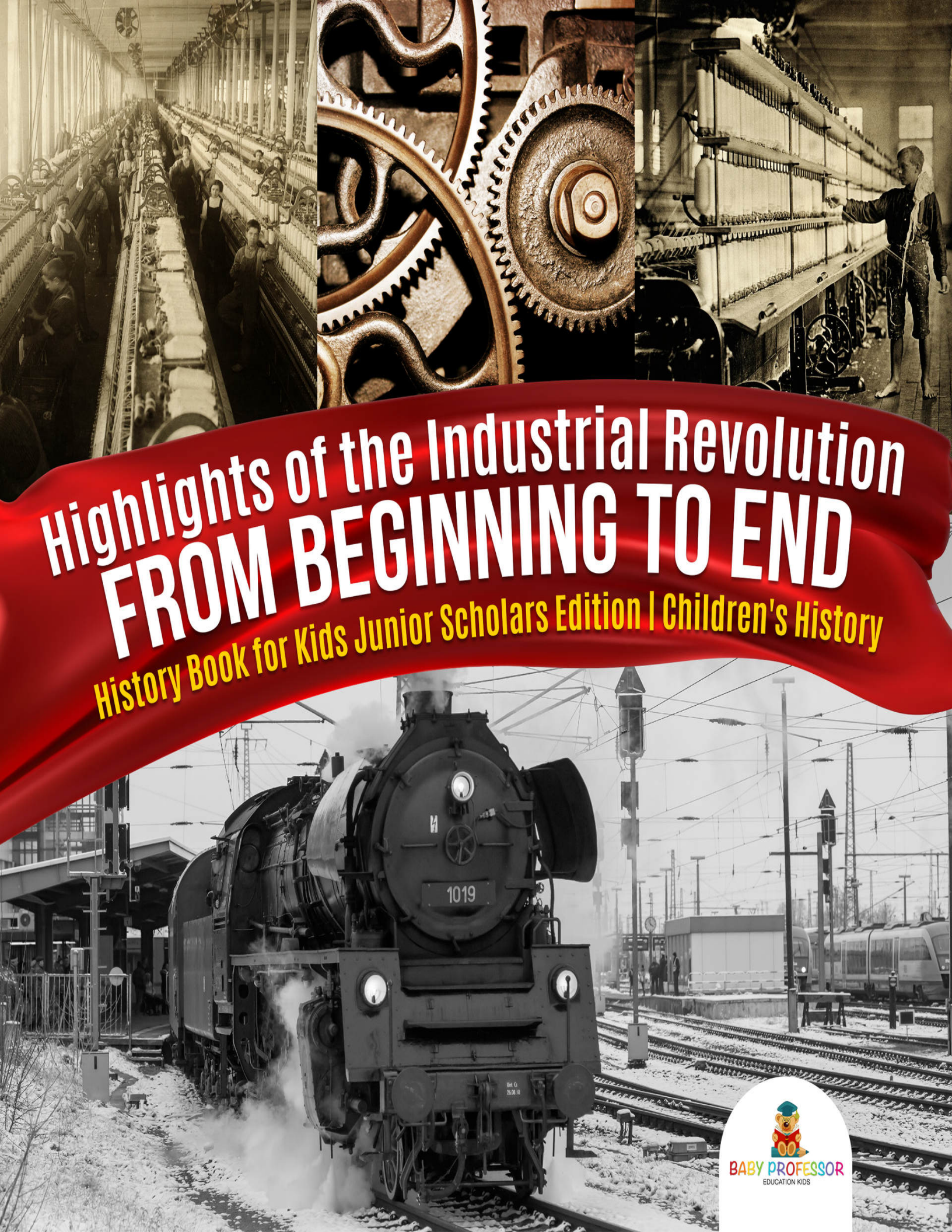

Highlights of the Industrial Revolution FROM BEGINNING TO END

History Book for Kids Junior Scholars Edition | Children's History

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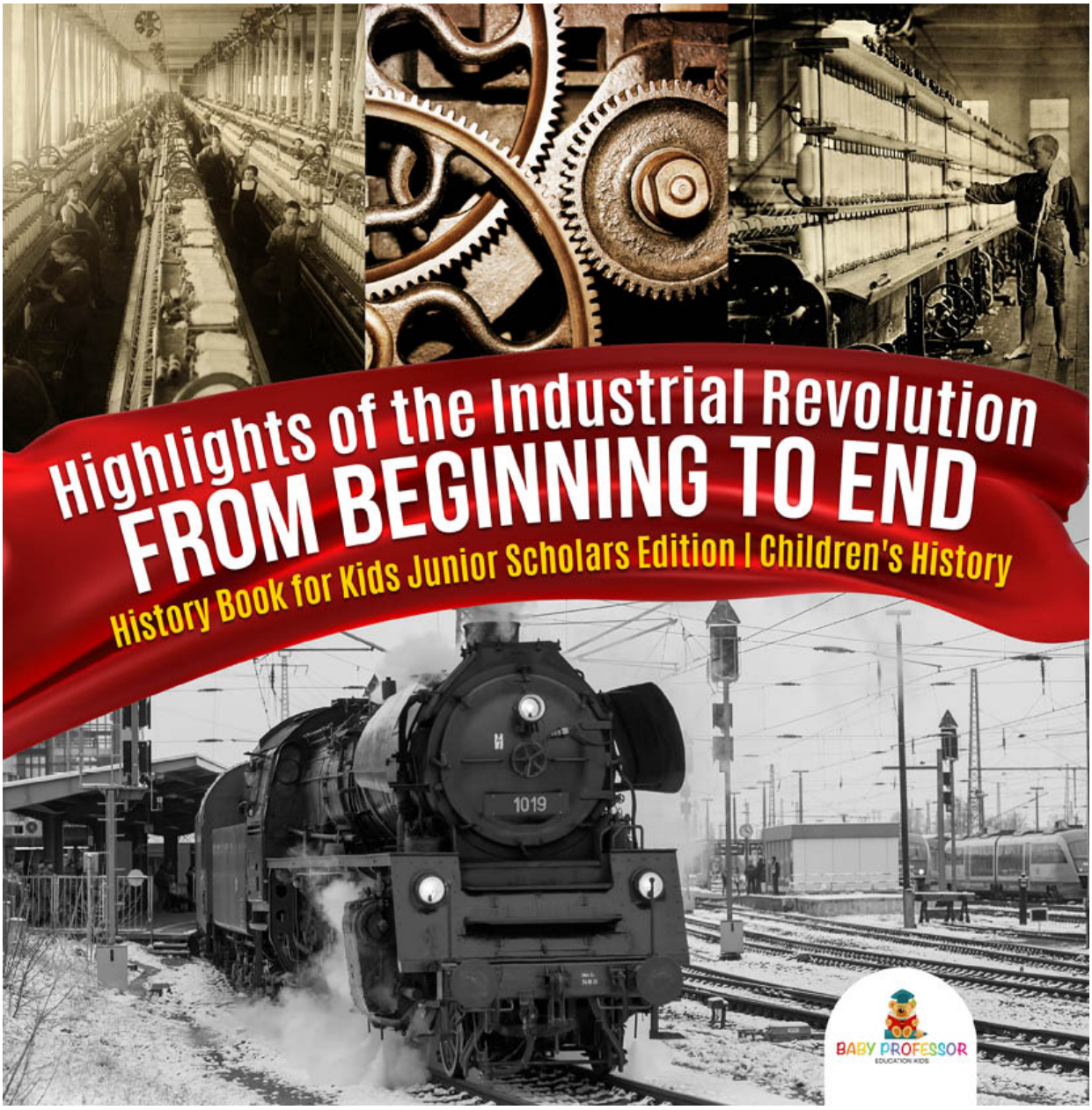
Highlights of the Industrial Revolution
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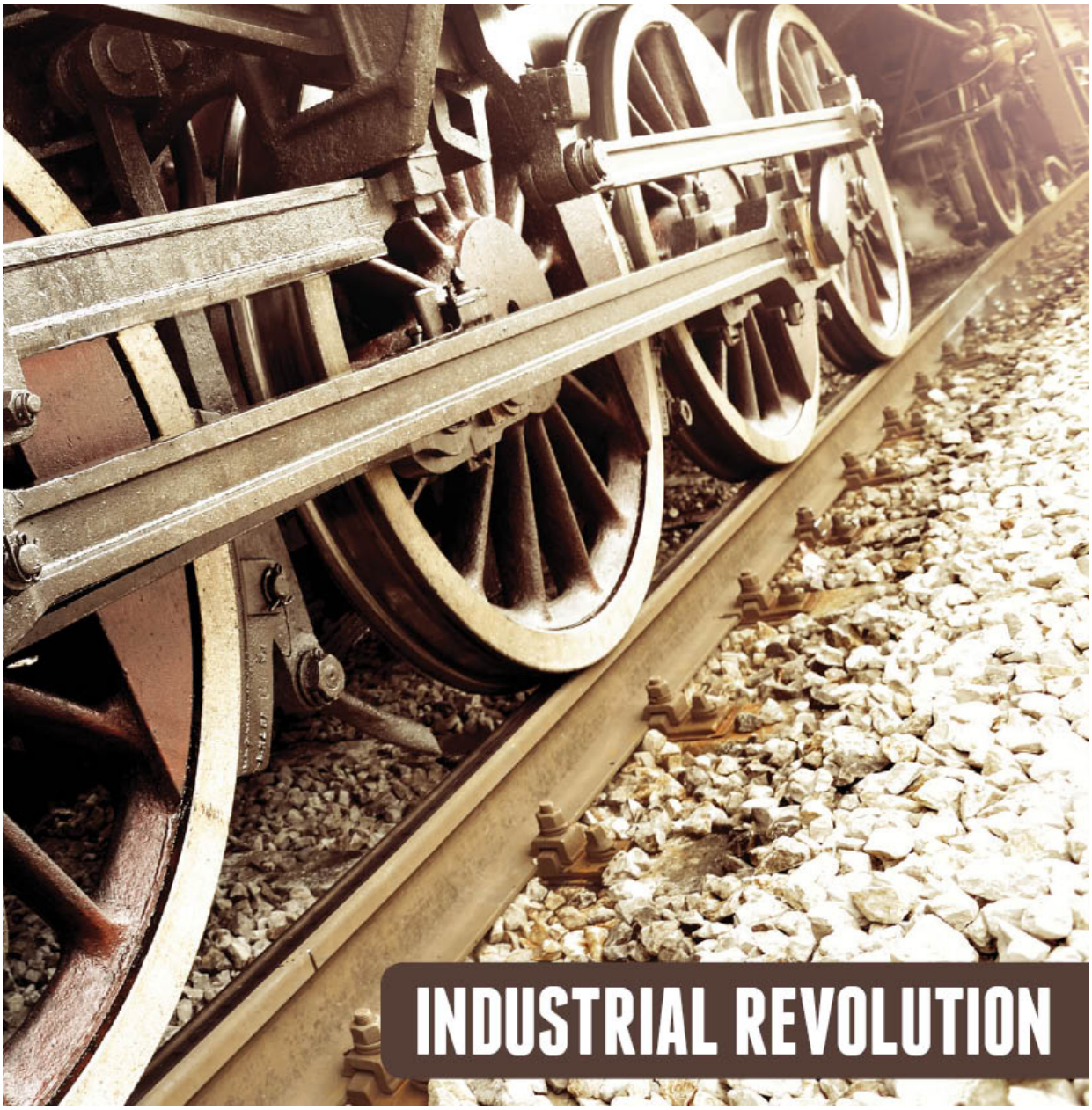
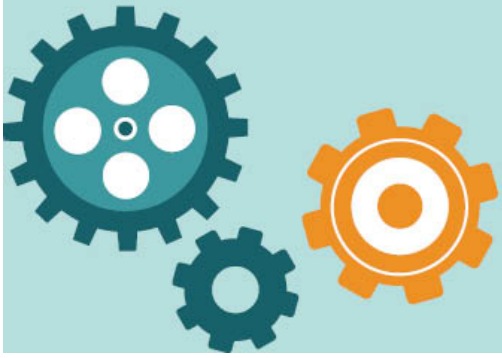
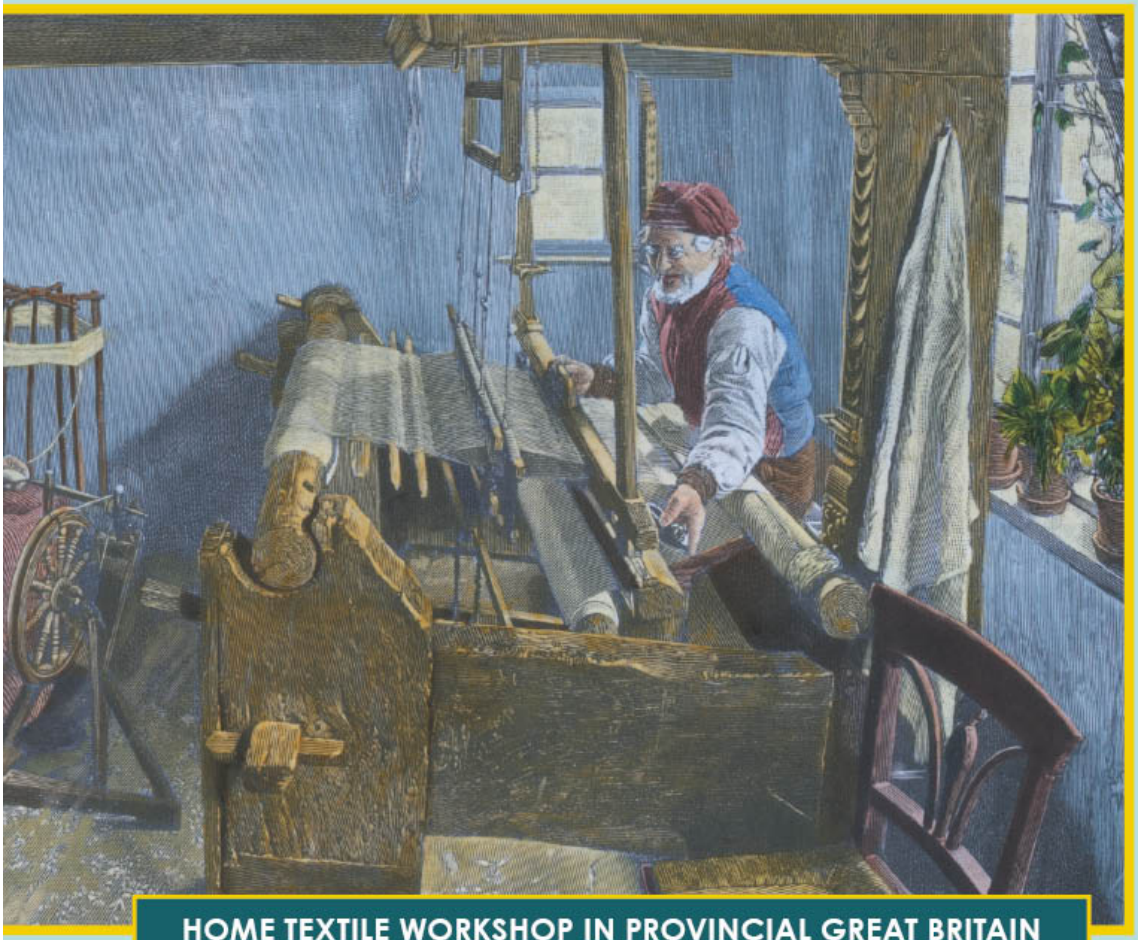
If you hear the phrase Industrial Revolution, the first thing that would come to mind are "machines." The reason is because the Industrial Revolution was a period of transition to the use of new manufacturing processes in the US and in Europe. It lasted from 1760 to 1840. Let's learn more about the Industrial Revolution.

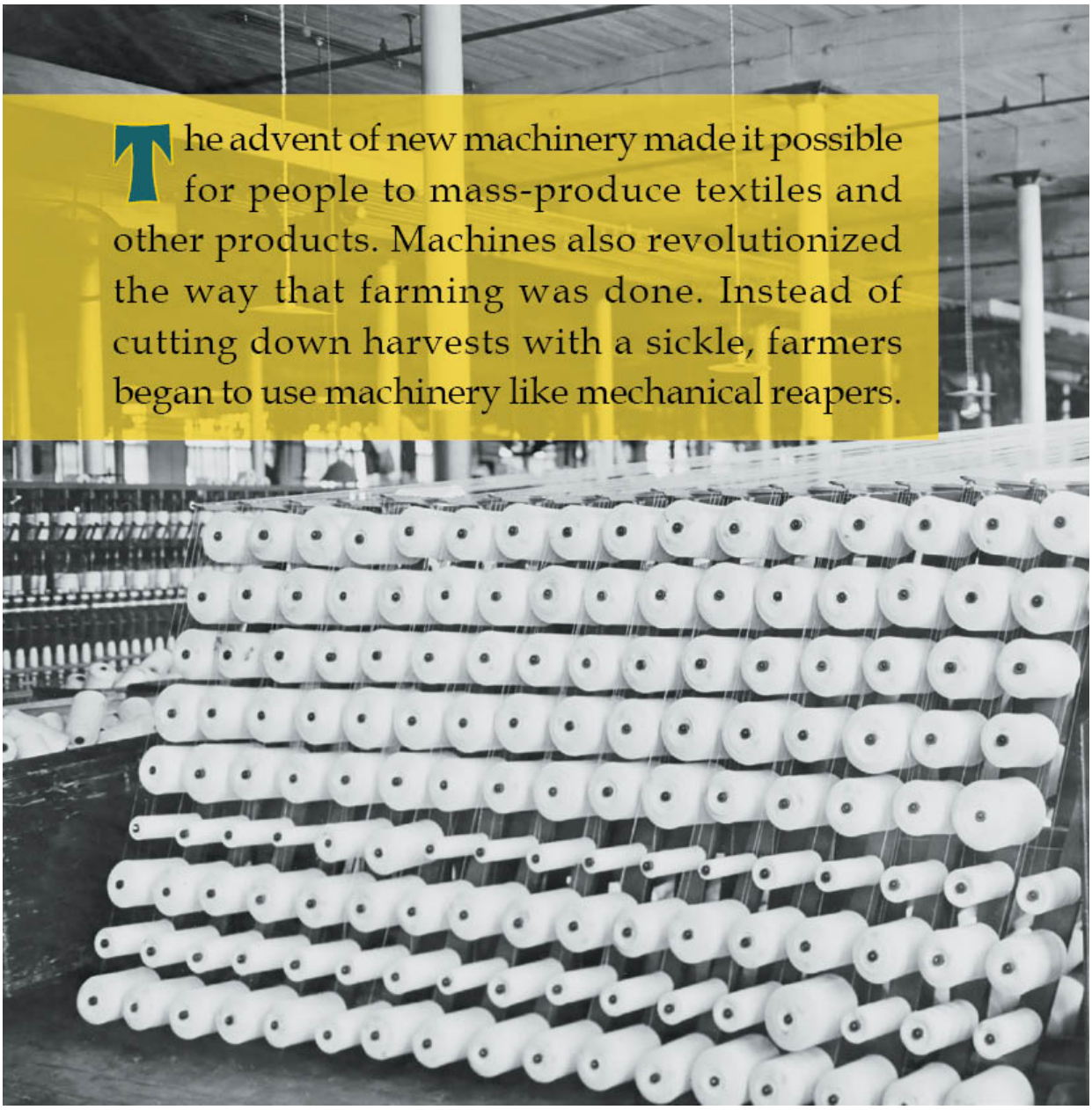

INDUSTRIAL REVOLUTION

The Industrial Revolution is the name that represents an era in history. It began in Great Britain and spread throughout Europe and then the United States. The word "revolution" here doesn't mean a war. Instead, it means a huge shift in culture. Prior to this time, textiles and fabrics were made at home.

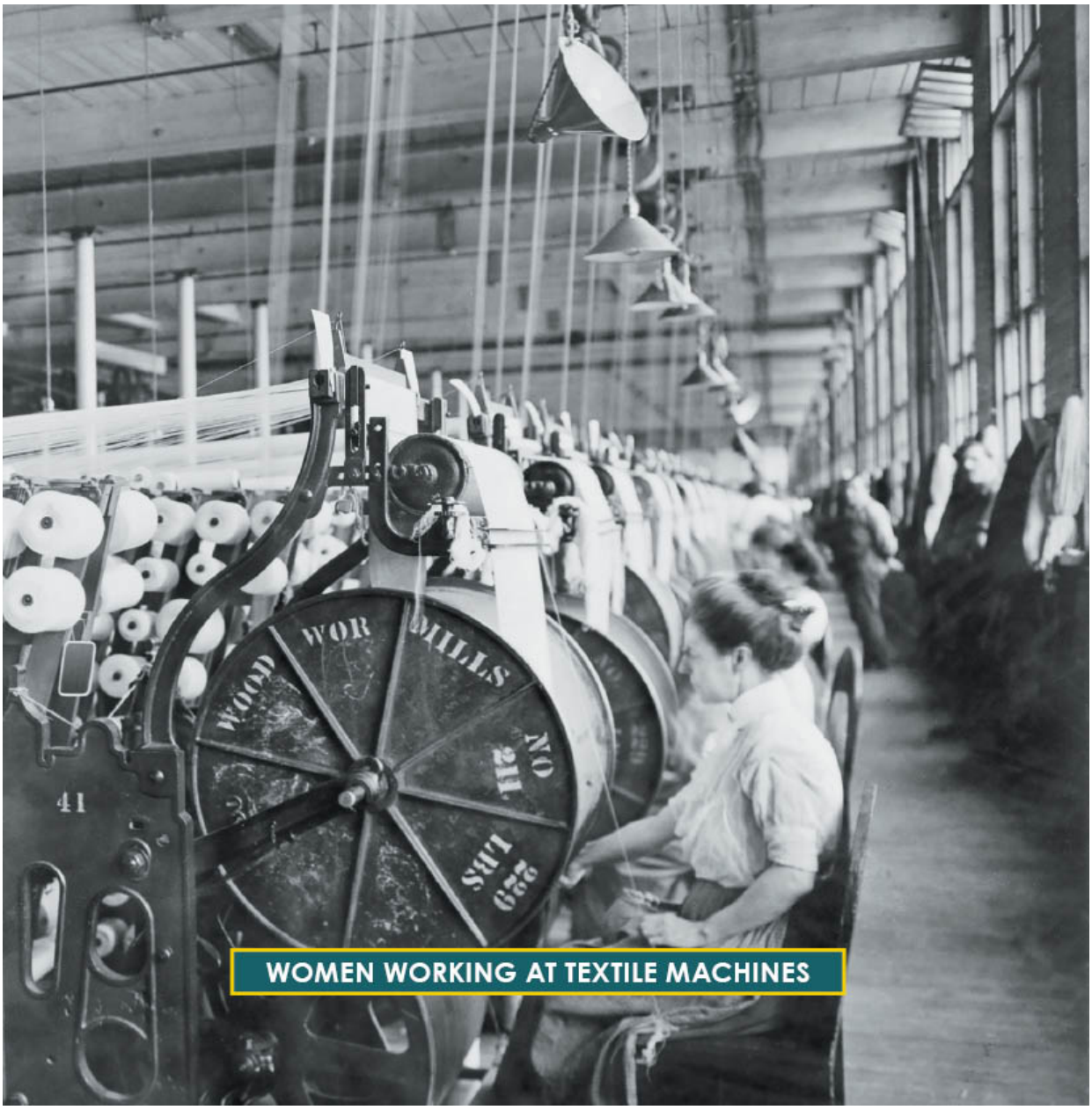




HOME TEXTILE WORKSHOP IN PROVINCIAL GREAT BRITAIN



The advent of new machinery made it possible for people to mass-produce textiles and other products. Machines also revolutionized the way that farming was done. Instead of cutting down harvests with a sickle, farmers began to use machinery like mechanical reapers.



WOMEN WORKING AT TEXTILE MACHINES

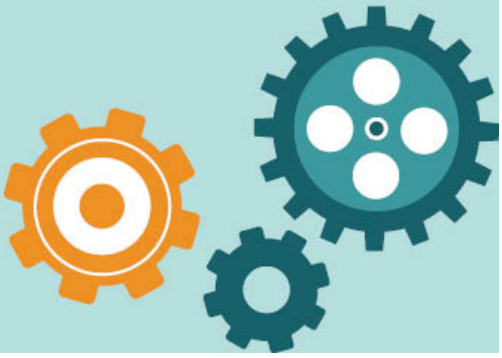
WHERE DID THIS ERA BEGIN?

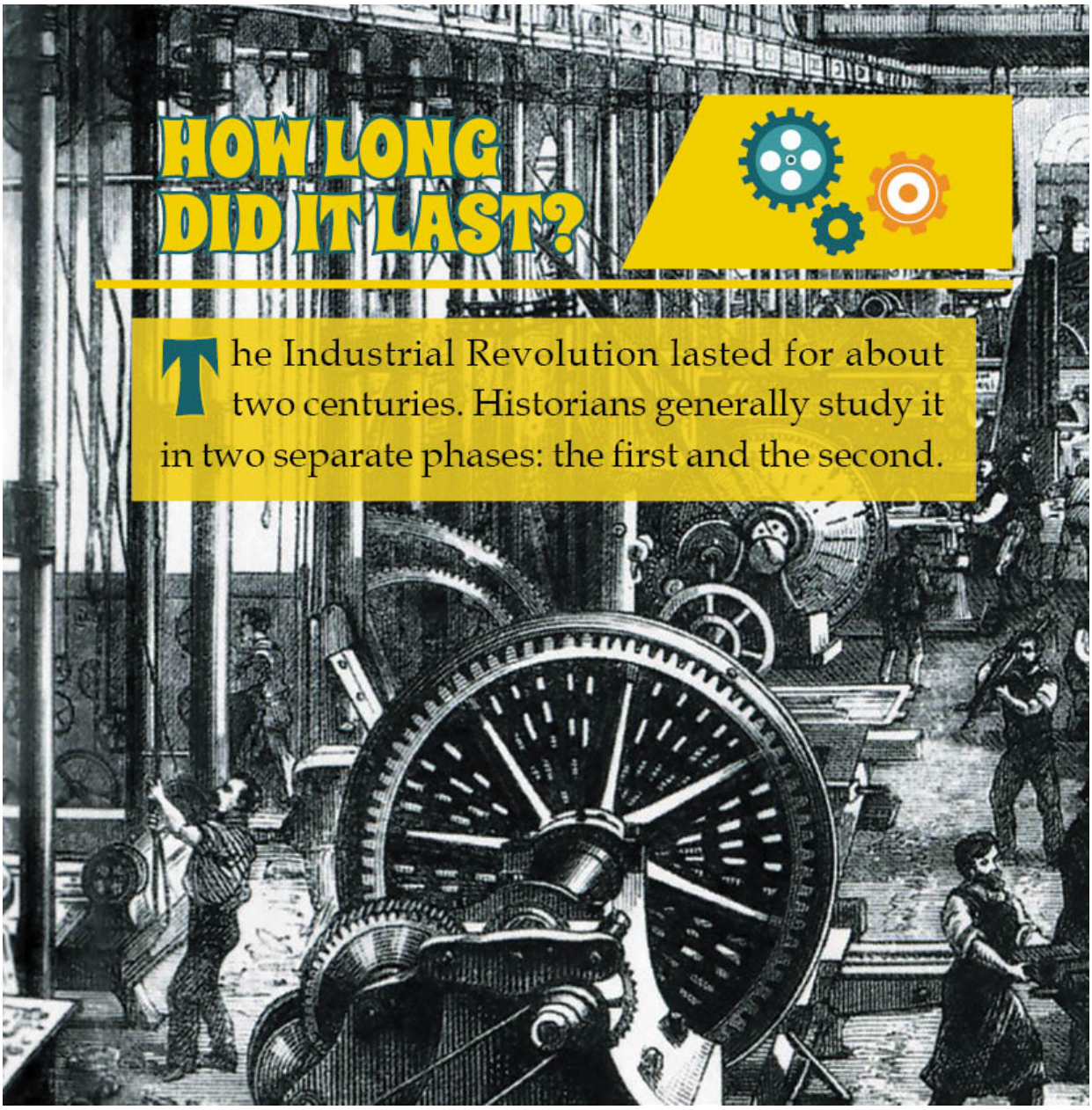
Great Britain was the first place where this shift in culture happened. This took place in the late 1700s and was spurred on by new inventions in the making of textiles. Women were making thread, fabric, and garments at home, which was a time-consuming and arduous process. With the new machinery, it was possible to mass-produce all the steps needed to make garments.

POWER LOOM WEAVING IN A COTTON MILL


1602
TEXTILE MACHINE

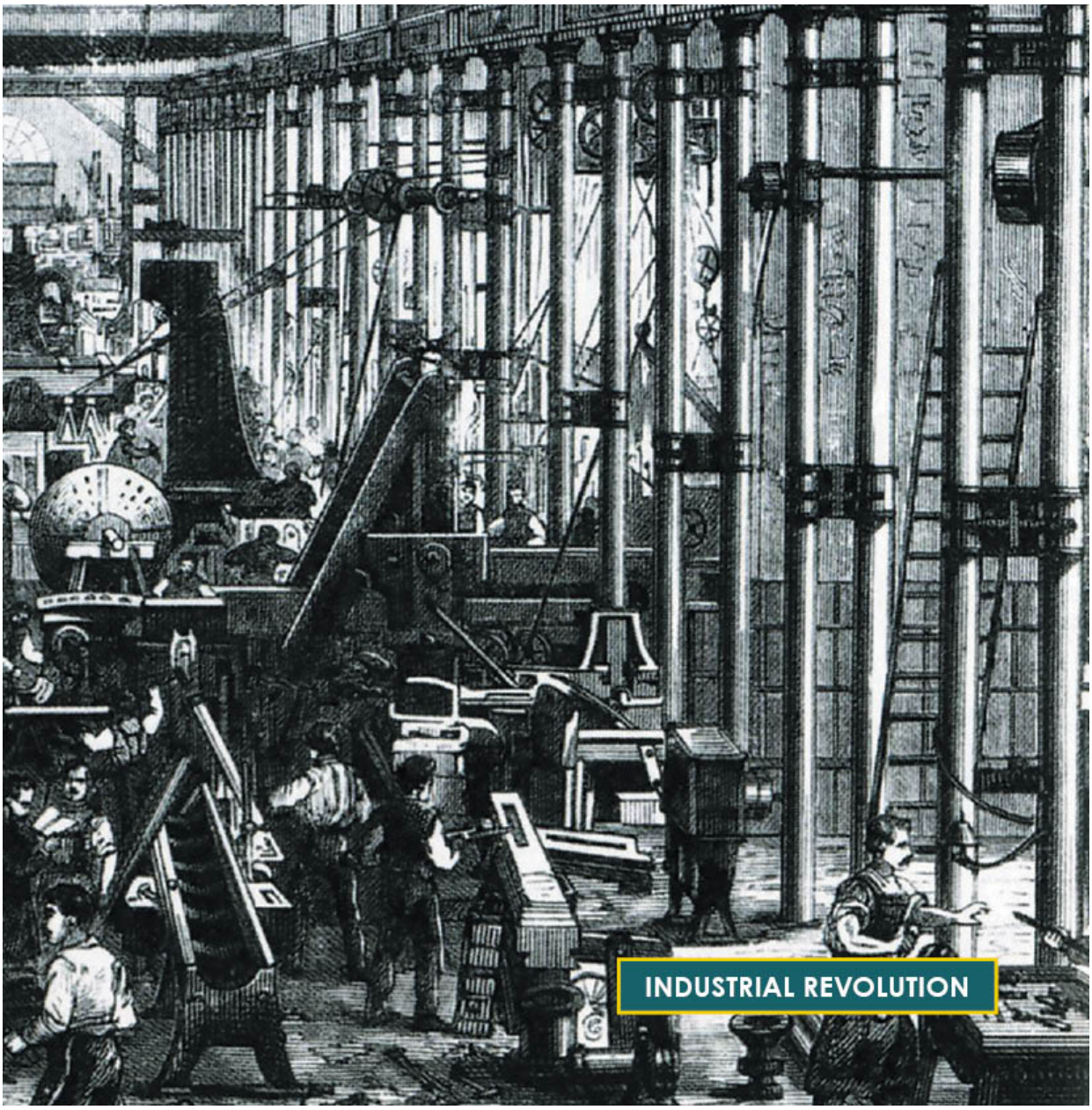
At the beginning, water power provided the necessary energy, but soon there was electricity. Great Britain was rich in the resources of both coal as well as iron, which made it possible to power and build these new machines.





HOW LONG DID IT LAST?

The Industrial Revolution lasted for about two centuries. Historians generally study it in two separate phases: the first and the second.


INDUSTRIAL REVOLUTION

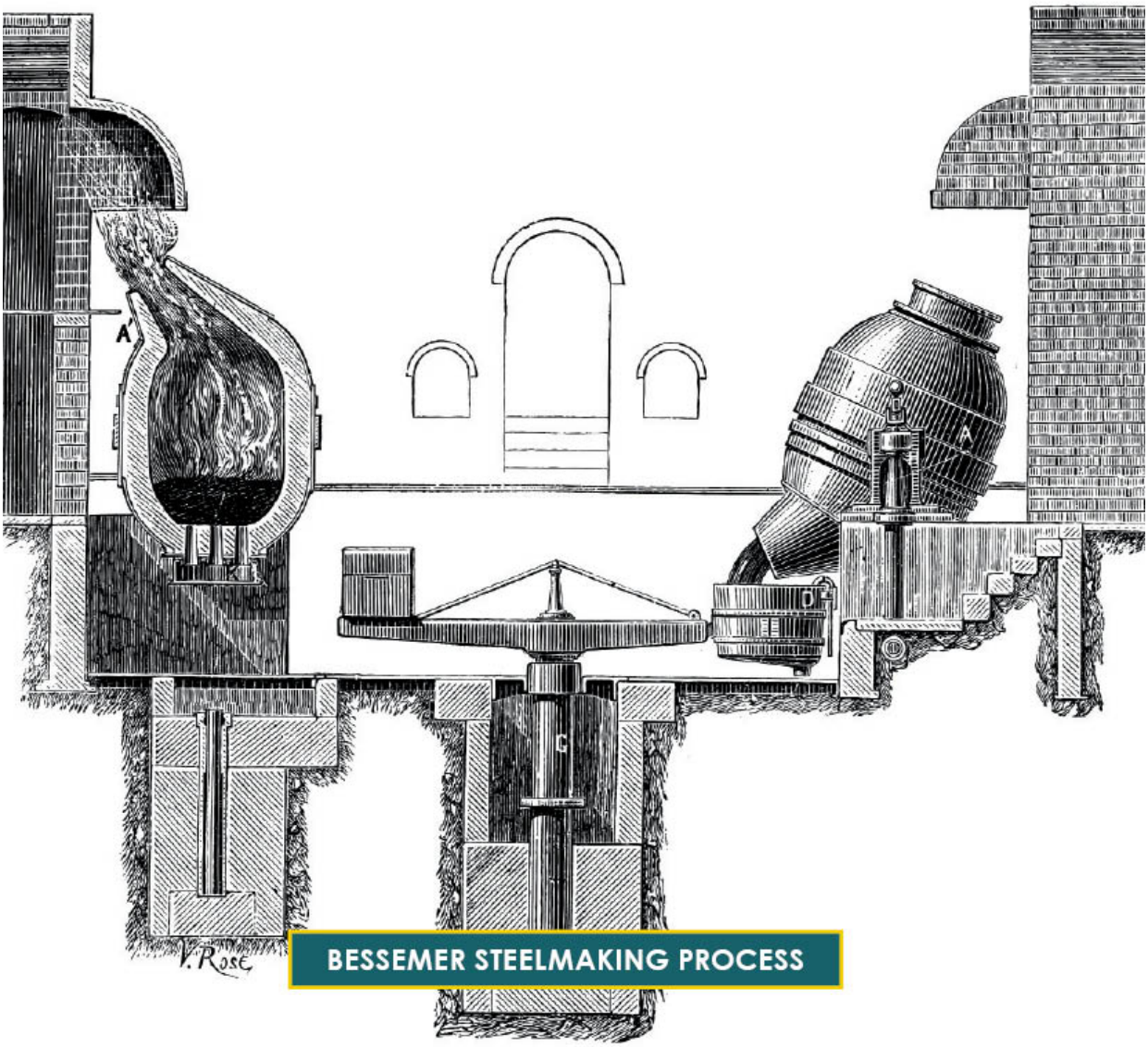
SPINNING JENNY

The First Industrial Revolution

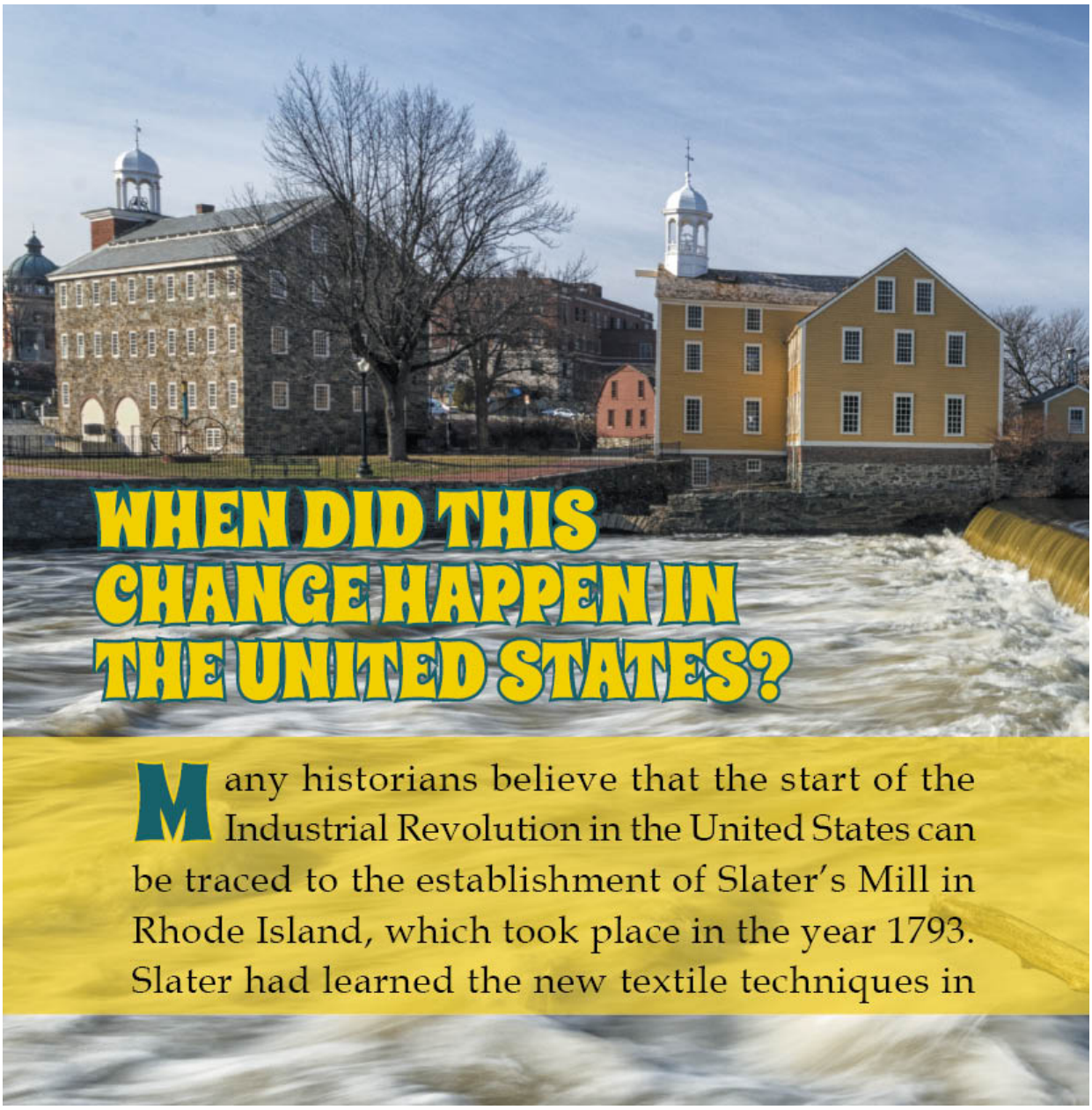
The first phase began in the late 1700s and continued to the middle of the 1800s. During this time, the textile industry transformed from spinning and sewing in rural homes to mass production in urban factories. The invention of steam energy made this possible. Also, the inventions of the spinning jenny, the spinning mule, and the cotton gin all made it possible to mass-produce textiles.

The Second Industrial Revolution

The next portion of the era lasted from the middle of the 1800s to the beginning of the 1900s. This was the era when new technologies came into play. The inexpensive production of quality steel made possible by Henry Bessemer, the advent of electrical power stations, and the invention of the assembly line all increased the industrial power of Europe, Great Britain, and the United States.

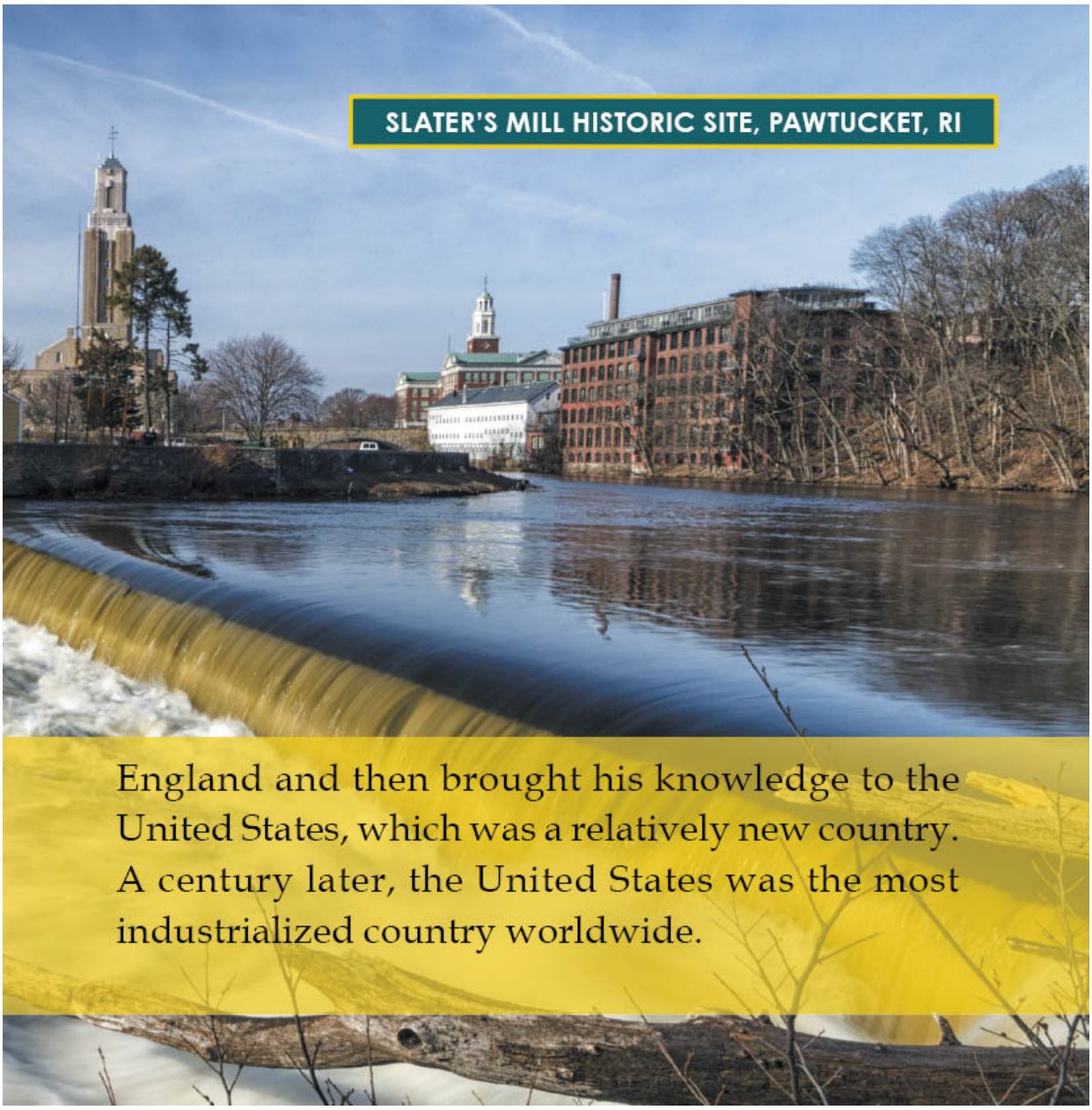


BESSEMER STEELMAKING PROCESS



WHEN DID THIS CHANGE HAPPEN IN THE UNITED STATES?

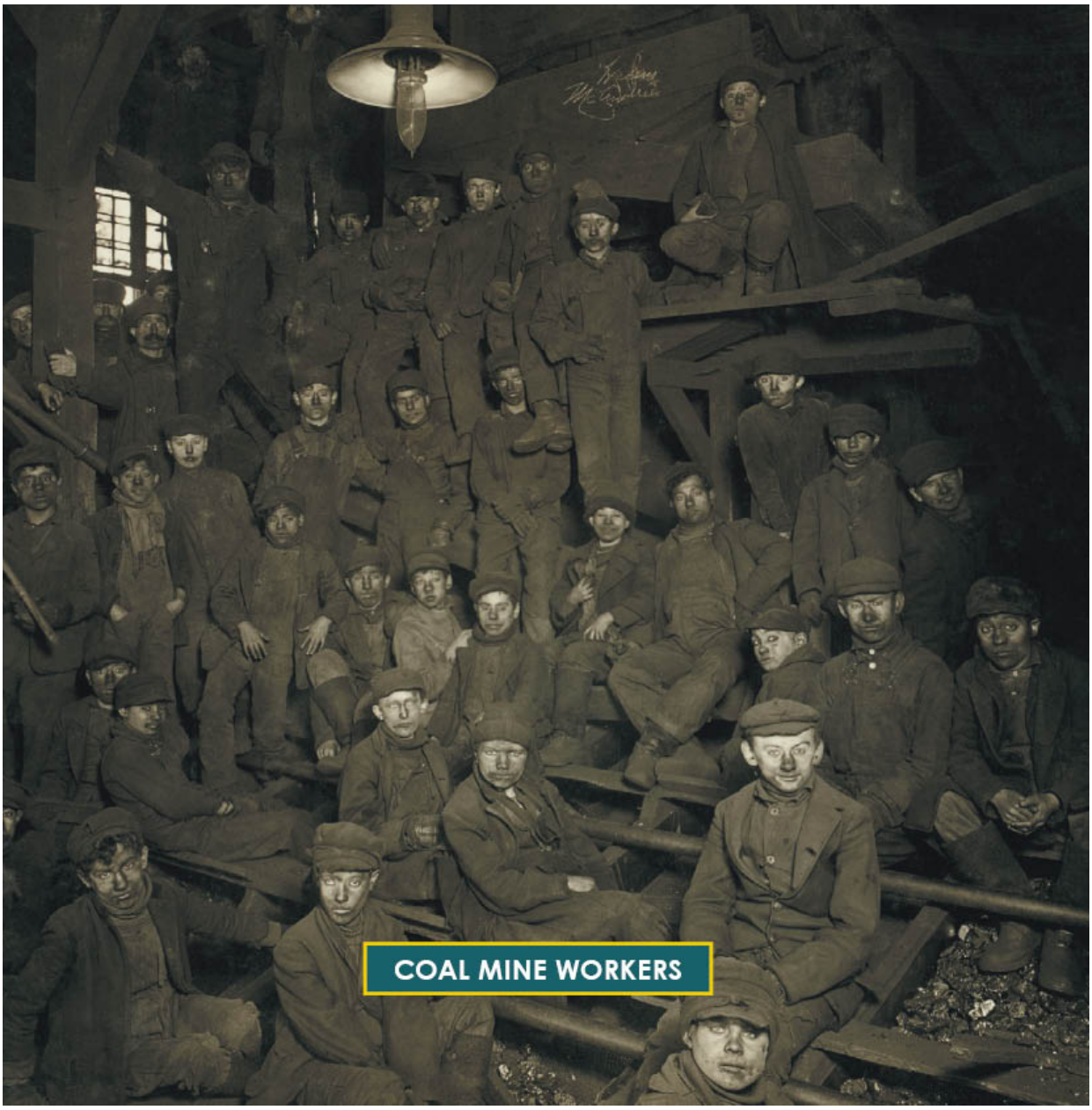
Many historians believe that the start of the Industrial Revolution in the United States can be traced to the establishment of Slater's Mill in Rhode Island, which took place in the year 1793. Slater had learned the new textile techniques in



England and then brought his knowledge to the United States, which was a relatively new country. A century later, the United States was the most industrialized country worldwide.

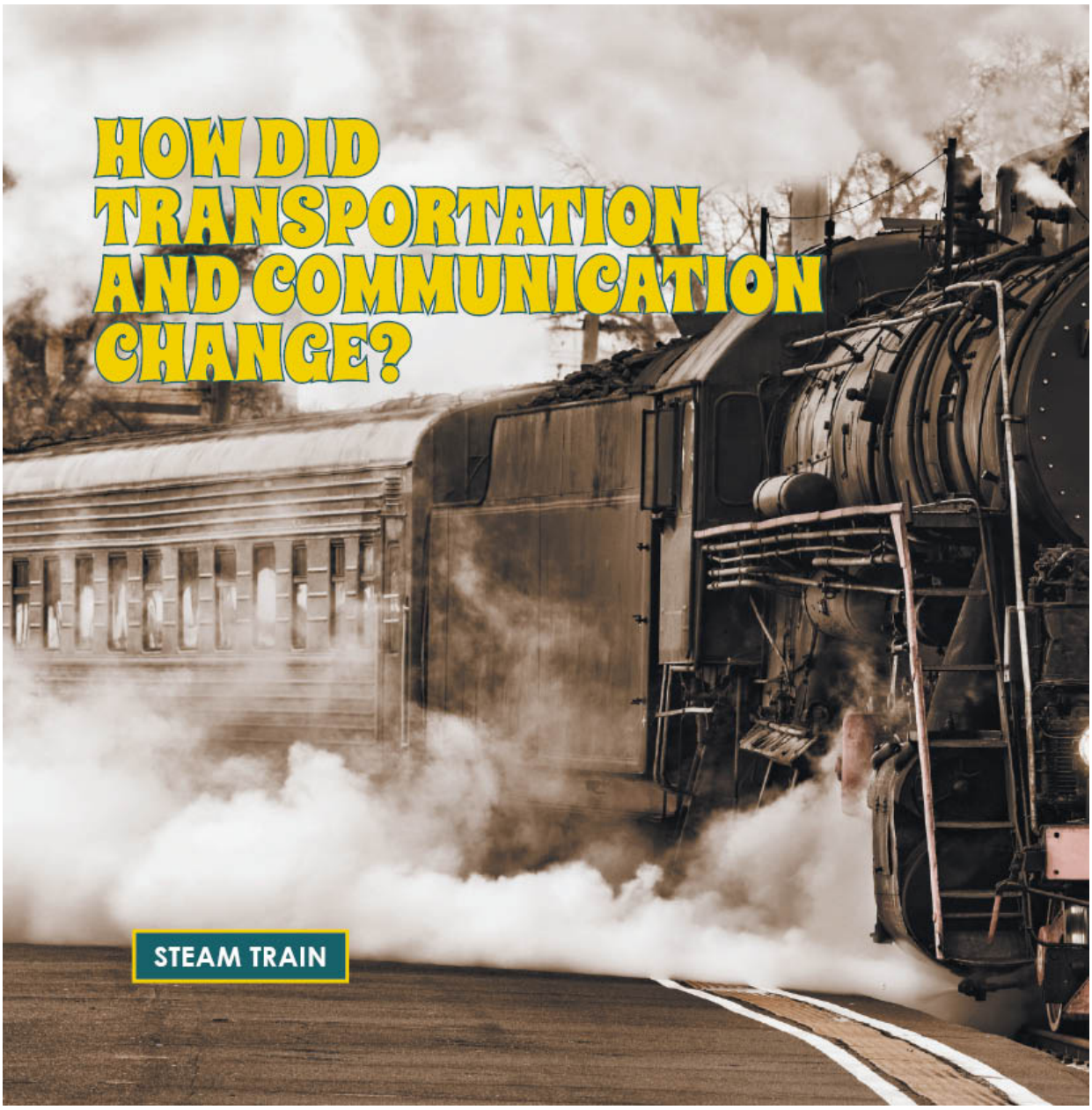
WHAT TYPES OF CULTURAL CHANGES WERE THERE?

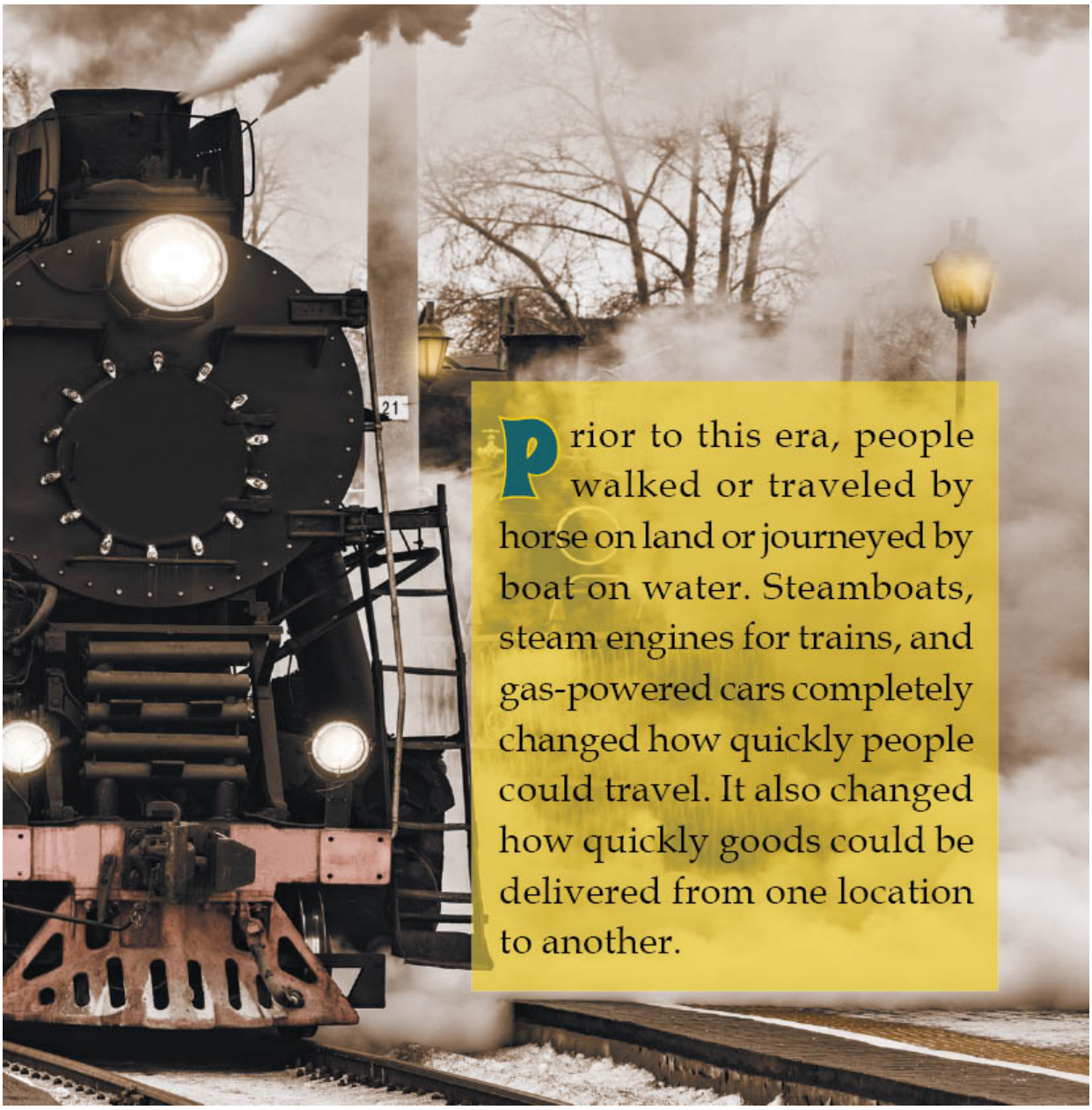
Prior to this era, most people lived on farms. However, with new jobs being created in the cities, people moved there to get work. Unfortunately, the cities were not equipped to deal with the influx of population. The working conditions were very poor. Workers often lived in tight quarters that were unclean and overcrowded.


COAL MINE WORKERS

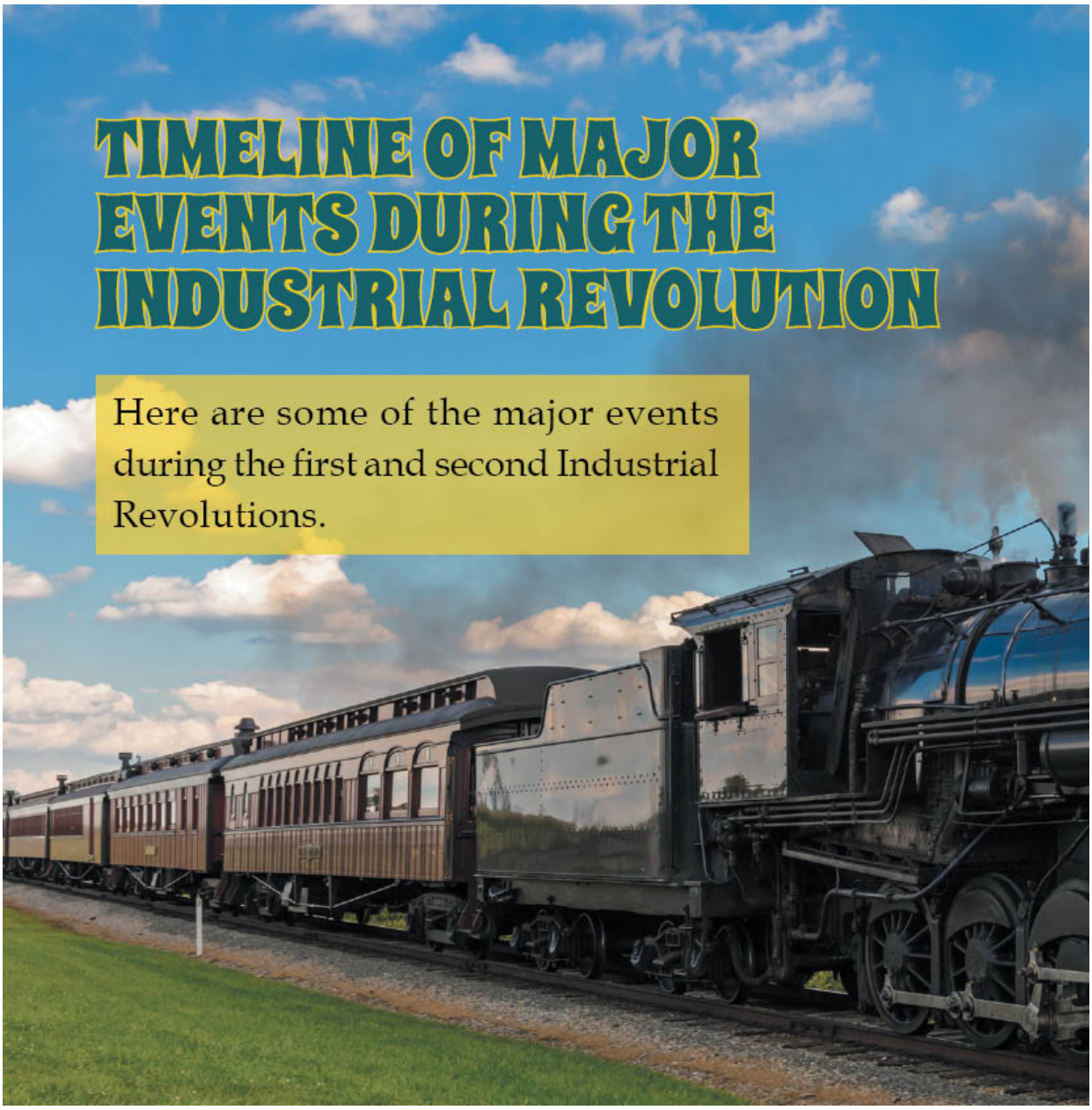
YOUNG BOYS AND GIRLS WORKING IN THE SPINNING ROOM

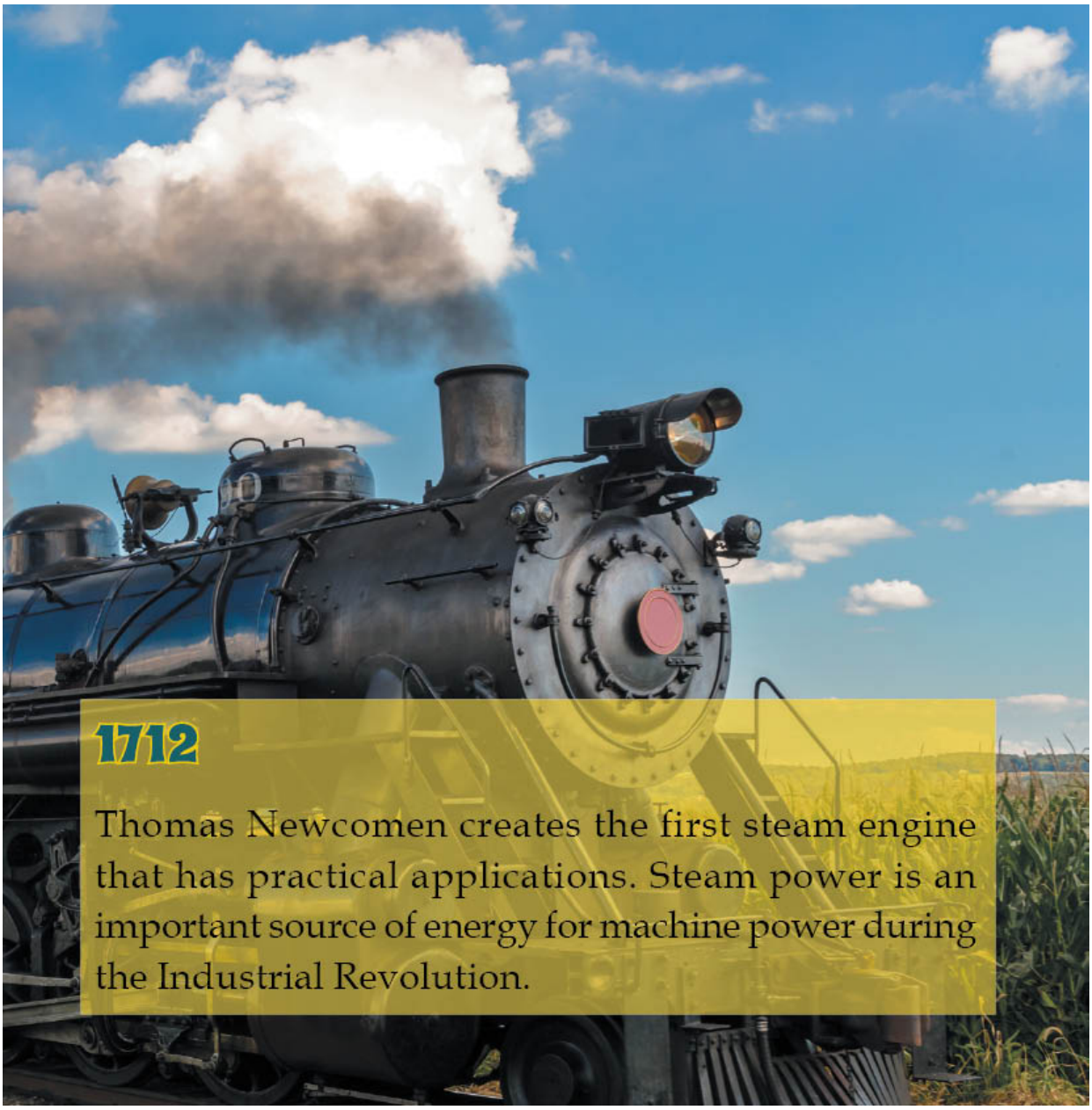
It took a long time for conditions to improve for workers. Working conditions in the factories were often very hazardous. People, even children, worked very long hours. Eventually, by the end of the 1900s, laws were put into place to protect workers.


HOW DID TRANSPORTATION AND COMMUNICATION CHANGE?
STEAM TRAIN



Prior to this era, people walked or traveled by horse on land or journeyed by boat on water. Steamboats, steam engines for trains, and gas-powered cars completely changed how quickly people could travel. It also changed how quickly goods could be delivered from one location to another.


TIMELINE OF MAJOR EVENTS DURING THE INDUSTRIAL REVOLUTION
Here are some of the major events during the first and second Industrial Revolutions.



1712

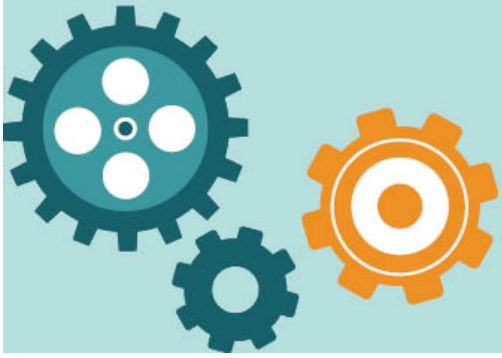
Thomas Newcomen creates the first steam engine that has practical applications. Steam power is an important source of energy for machine power during the Industrial Revolution.

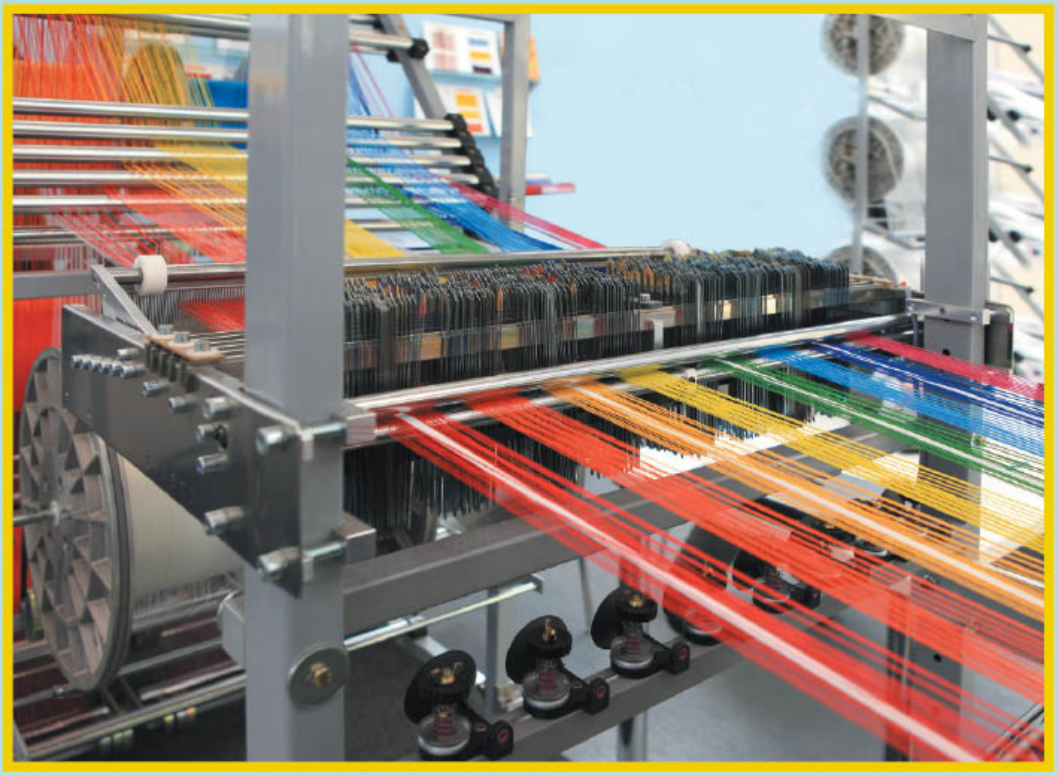
1760

The age described as the First Industrial Revolution starts in 1760. The production of textile in the country of Great Britain moves from manual work in rural homes to factory production in the city.

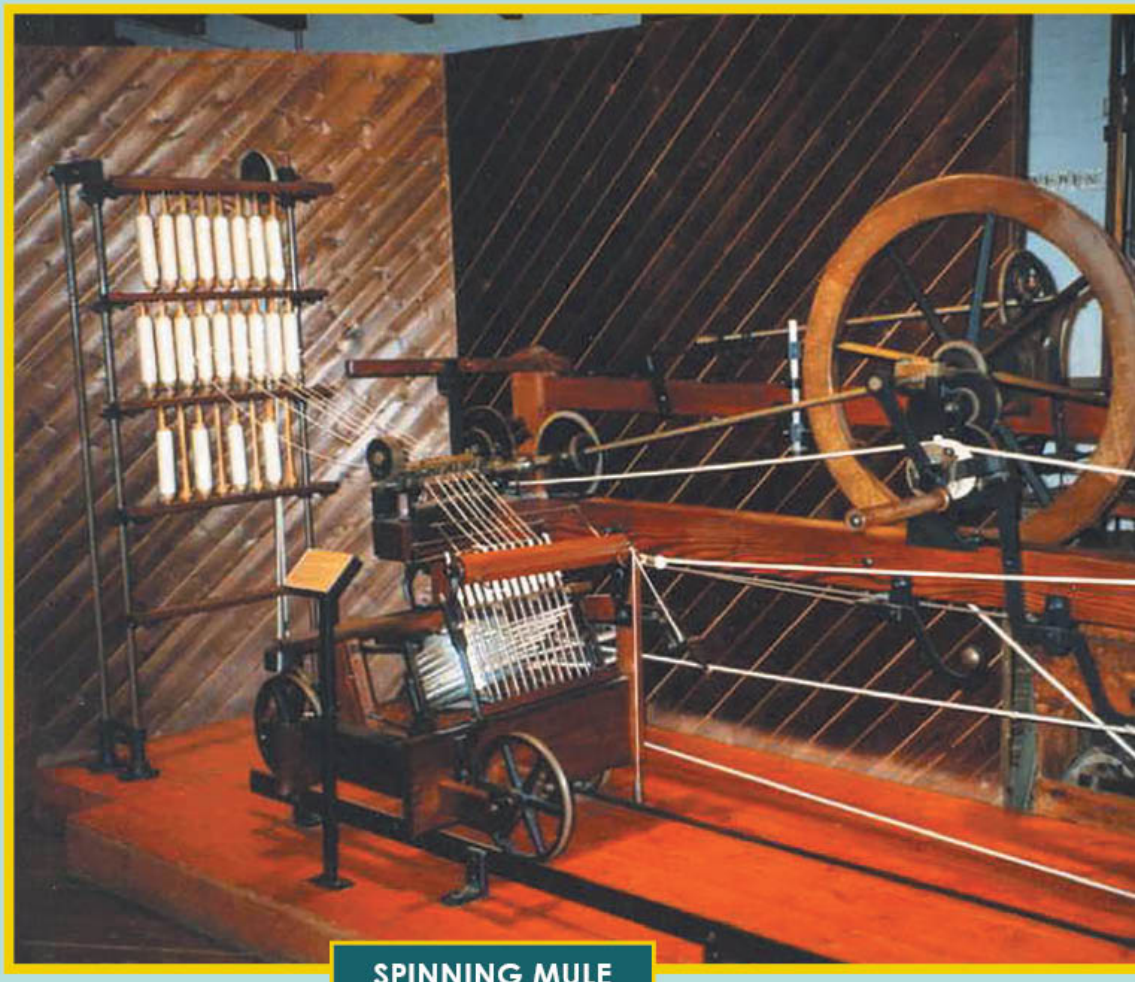
1764

The spinning jenny, invented by James Hargreaves, changes the way textiles are made. Workers can create threads by using numerous spools simultaneously.





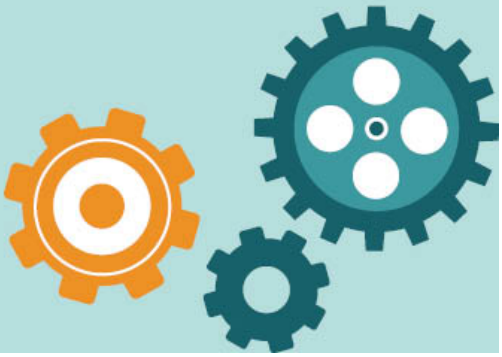
TEXTILE WEAVING FACTORY



SPINNING MULE

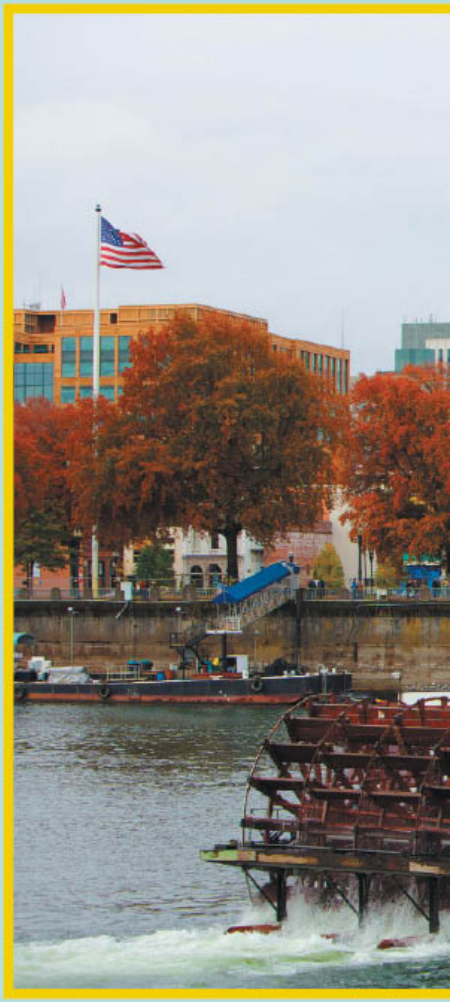
1779

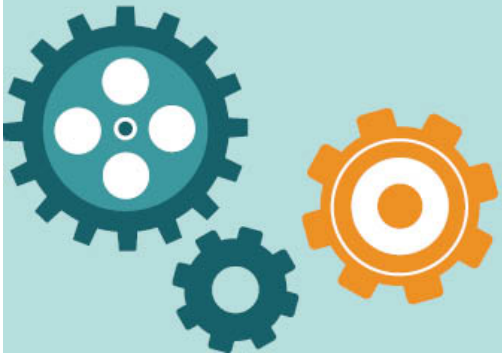
The spinning mule, devised by Samuel Crompton, was a combination of the spinning jenny and the water frame. That was why it was called a "mule" because it was a hybrid of two different machines. It sped up the time required to spin cotton and other fabrics.



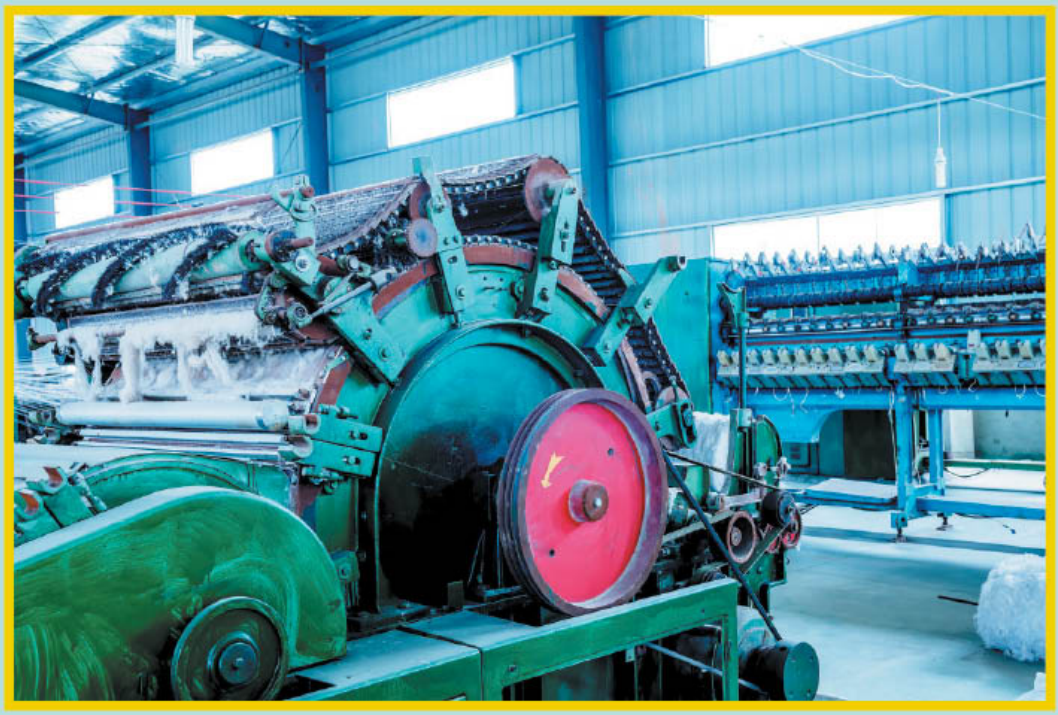
1781

James Watt takes out patents for a steam engine with improved features. This new steam engine is ideal for factories as well as for powering trains and steamboats.





STEAM BOAT



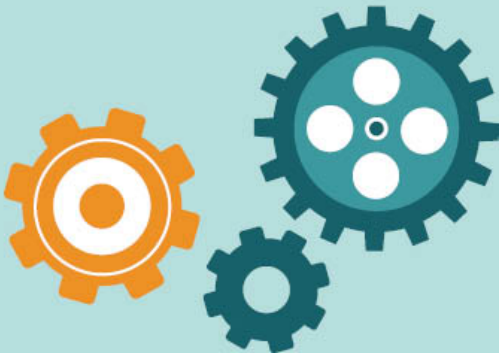
COTTON GIN

1793

The first mill, established by Samuel Slater, is opened in the state of Rhode Island, marking the official beginning of the Industrial Revolution in the United States.

1793

The cotton gin, invented by Eli Whitney, makes cotton processing much more efficient by separating the fibers of cotton from the cottonseeds.

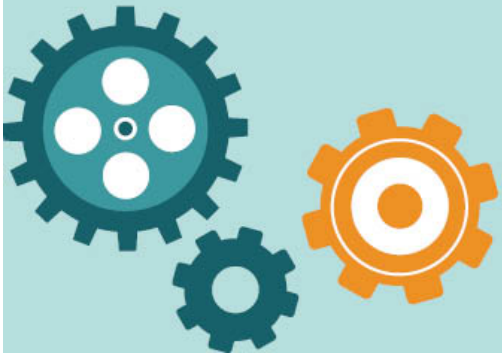


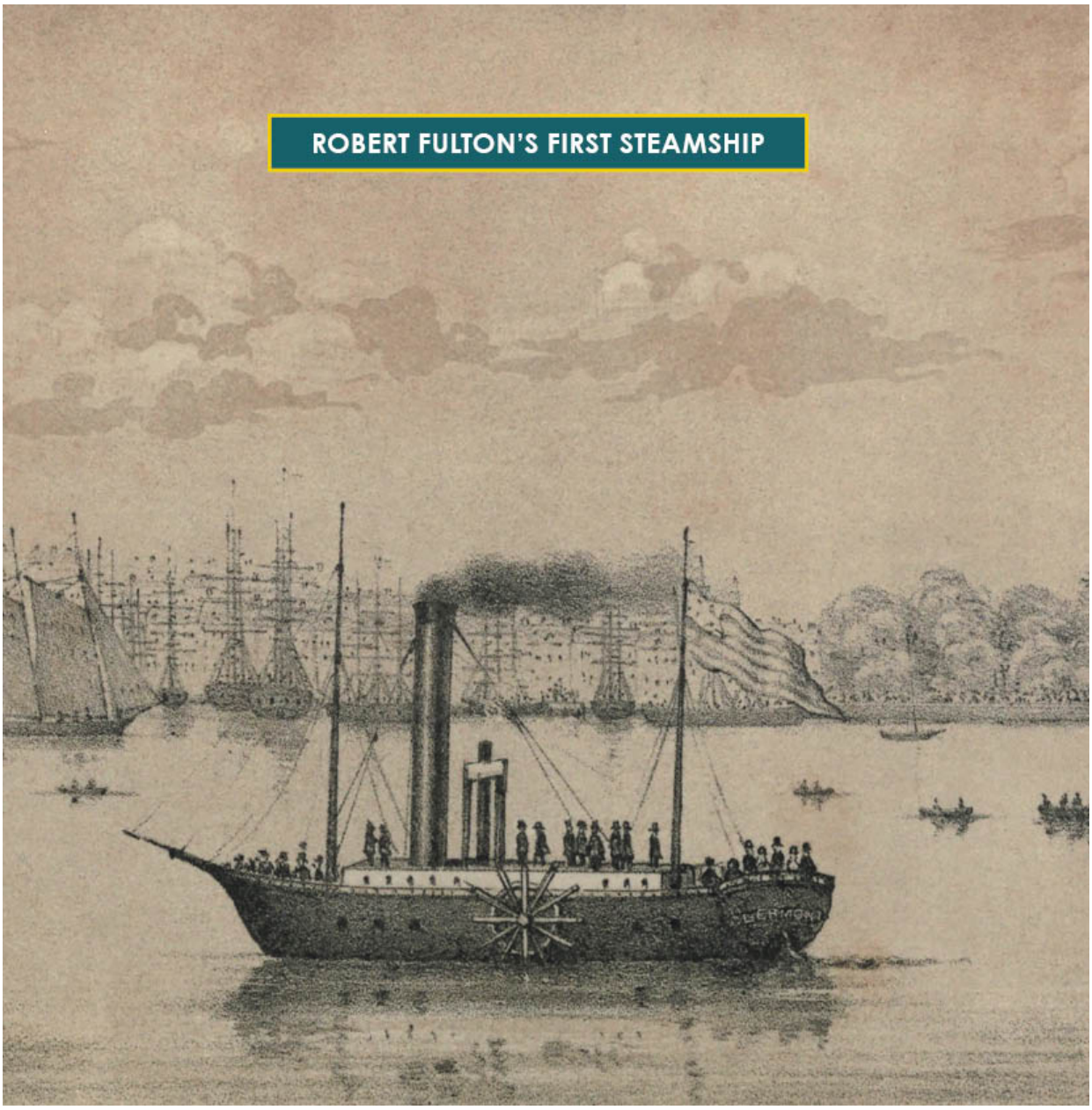
1807

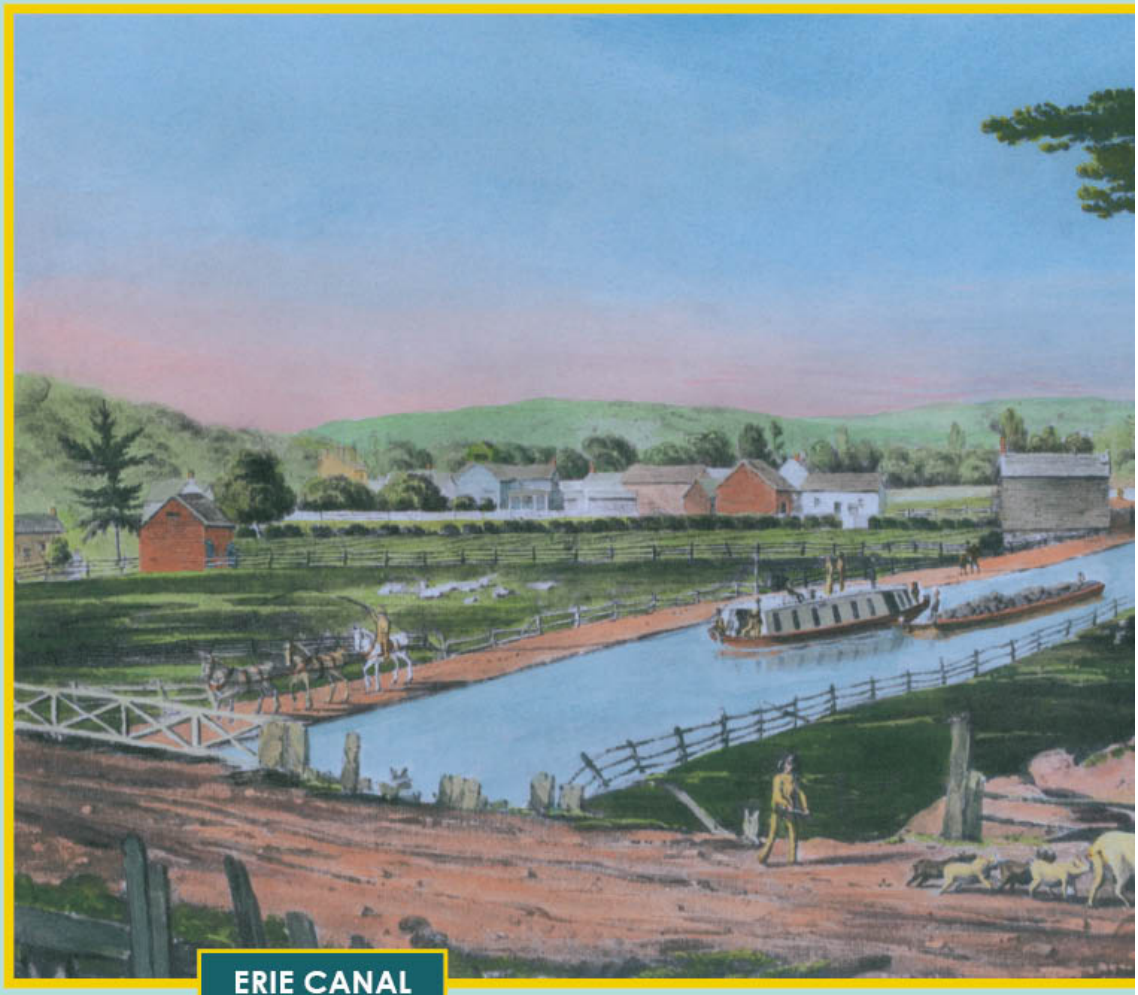
Robert Fulton begins the first steamboat business with his flagship boat called the *Clermont*.

1811

A group of citizens called the Luddites cause uprisings in Great Britain. They protest the changes of the Industrial Revolution by breaking machinery in factories.




ROBERT FULTON'S FIRST STEAMSHIP



ERIE CANAL

1824

In Great Britain, workers gather together in legalized trade unions.

1825

The construction of the Erie Canal is finished. It provides a route from the Great Lakes to the city of New York and out to the Atlantic Ocean.

MODERN MECHANICAL REAPER

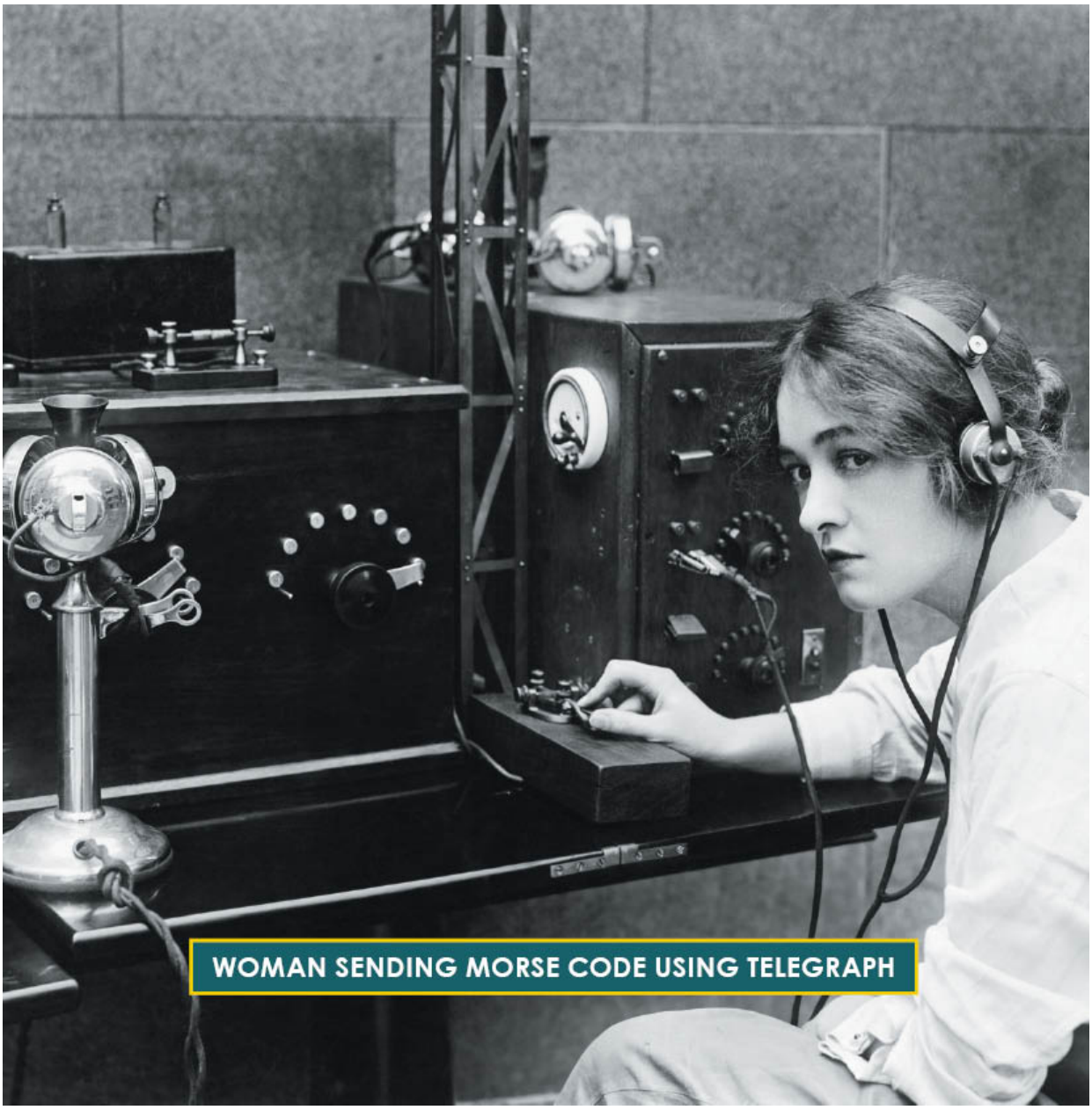
1831

Cyrus McCormick creates the first mechanical reaper. It made it possible for farmers to harvest crops by machine instead of using hand tools such as the sickle.

STEEL PLOW

1837

The steel plow, invented by blacksmith John Deere, made it possible for farmers to work more efficiently. It was difficult to scrape the sticky soil off of previous plows, which were made of iron.



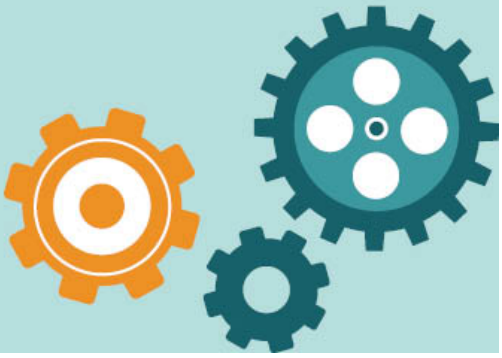
WOMAN SENDING MORSE CODE USING TELEGRAPH

1844

Samuel Morse creates the telegraph. The new invention allows people to send coded messages over long distances.

1844

Vulcanized rubber, invented by Charles Goodyear in 1844, is a hardened rubber that doesn't melt. Goodyear spent most of his life and all of his money perfecting the process of vulcanizing rubber.



1846

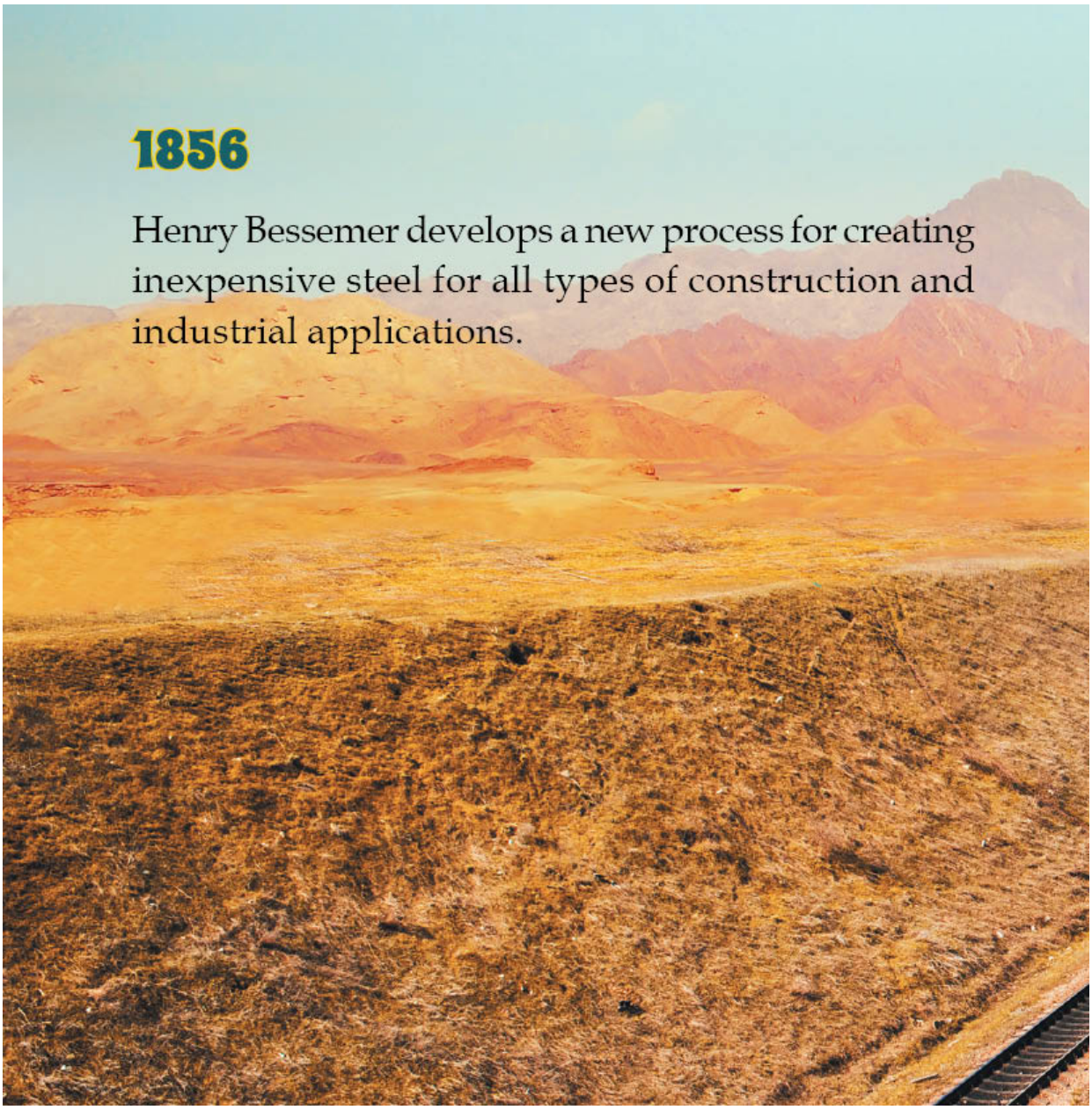
OLD SEWING MACHINE

Elias Howe designs the first practical sewing machine, which makes it possible for people to make garments much faster than by hand. This invention changed women's lives forever since prior to that time all stitching was done manually.

1853

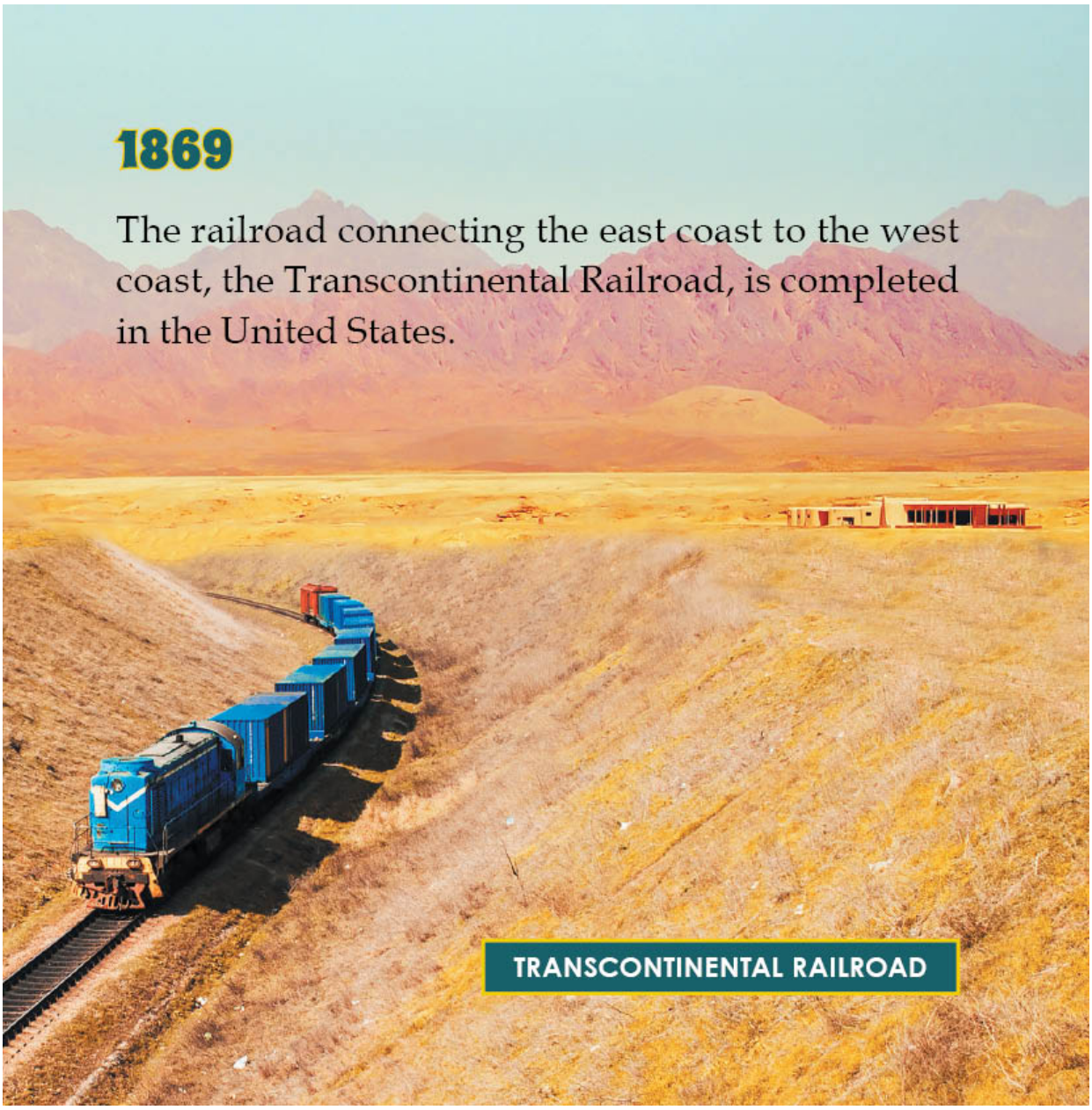
ELEVATOR DOOR

A safety break for elevators is created by Elisha Otis. Because of this invention, elevators became safer and it was possible for taller buildings including skyscrapers to be constructed.



1856

Henry Bessemer develops a new process for creating inexpensive steel for all types of construction and industrial applications.

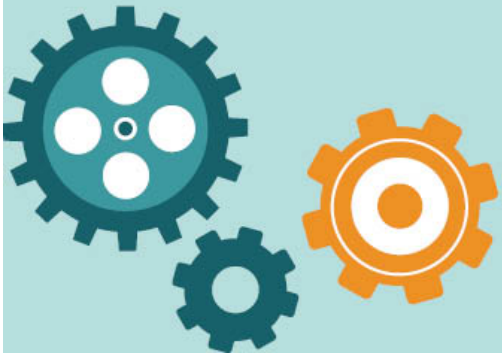

1869
The railroad connecting the east coast to the west coast, the Transcontinental Railroad, is completed in the United States.
TRANSCONTINENTAL RAILROAD

1870

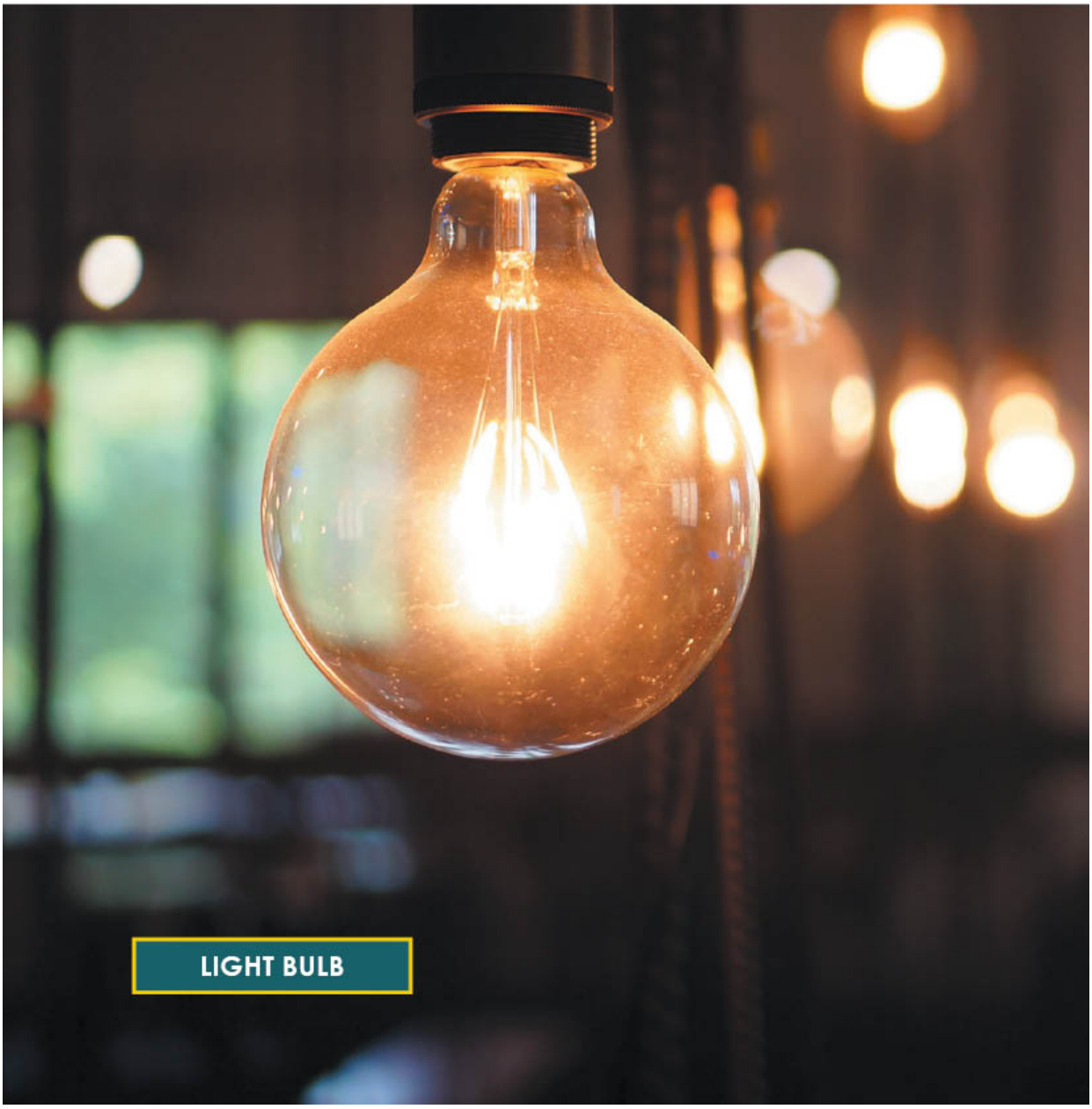
The year 1870 marks the beginning of the Second Industrial Revolution. During this era, new inventions such as the telephone, railways, and the distribution of electrical power expanded the economy and changed transportation and communication.

1876

Alexander Graham Bell creates the first practical form of the telephone.




OLD TELEPHONE

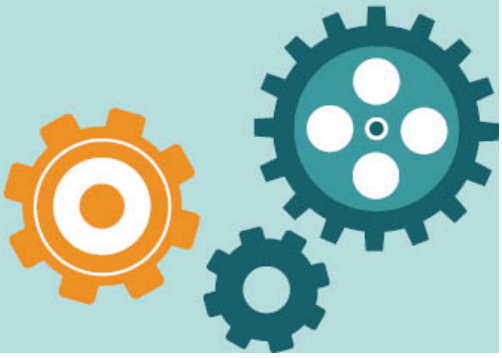

LIGHT BULB

1877

Workers go on strike on the railways after the railroad companies reduce their wages. Federal troops are called in to curb the violence during what is later called "The Great Railroad Strike."

1879

Thomas Edison and his team succeed in creating the first practical light bulb. Factories soon use electric lighting to create night shifts making it possible to produce more products in less time.

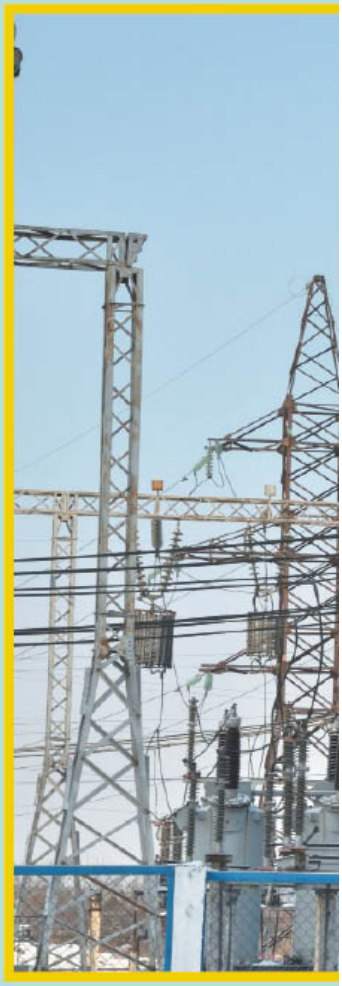


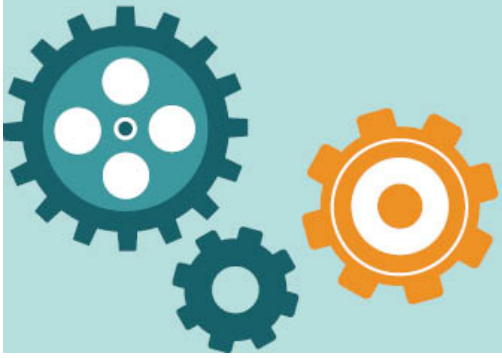
1886

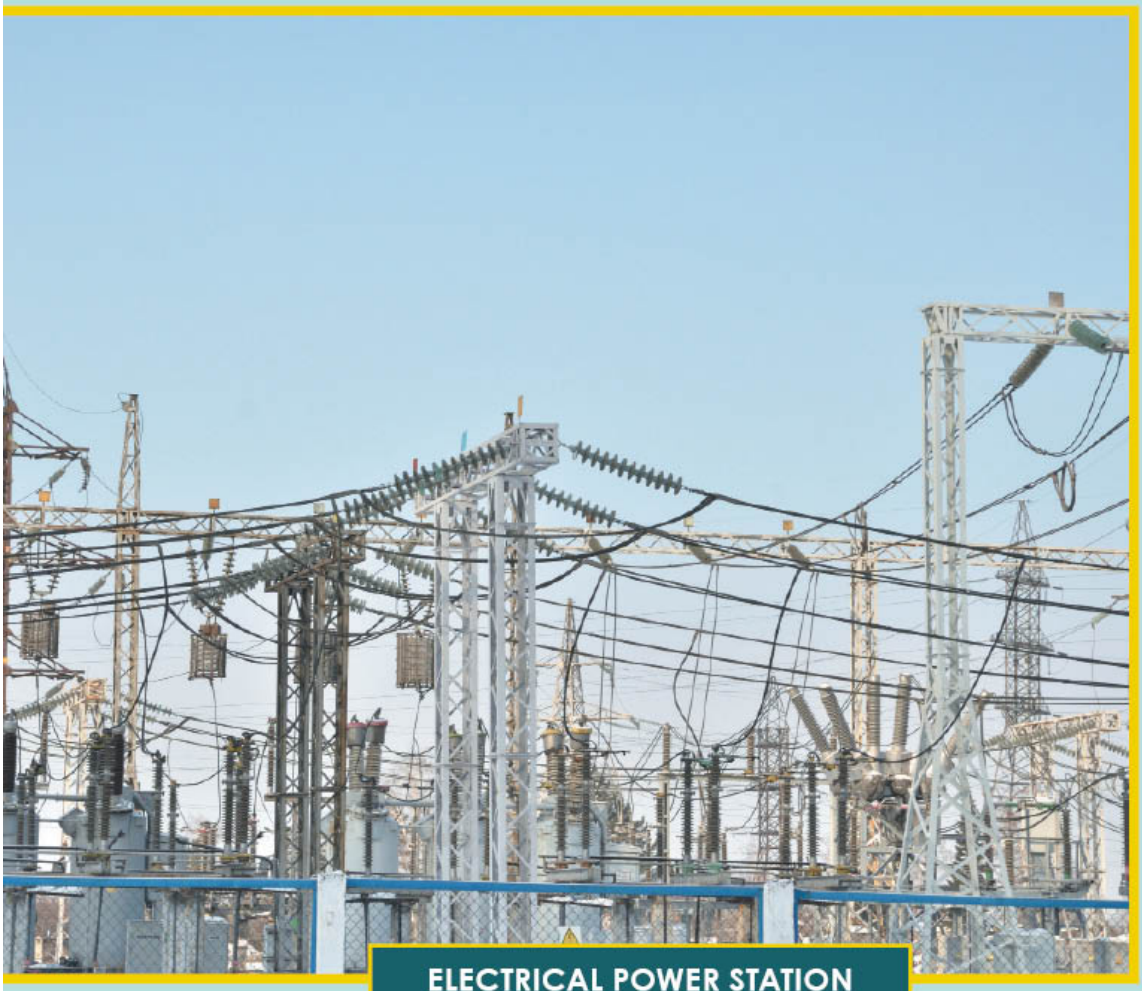
Workers gather together to protect their rights and the American Federation of Labor is established.

1891

The first practical electrical power station is built. It provides energy to the homes and businesses in the central section of London.







ELECTRICAL POWER STATION

OLD AIRPLANE

1903

The Wright Brothers make the very first successful flight with an airplane they built. The flight takes place at a location called Kitty Hawk in North Carolina.

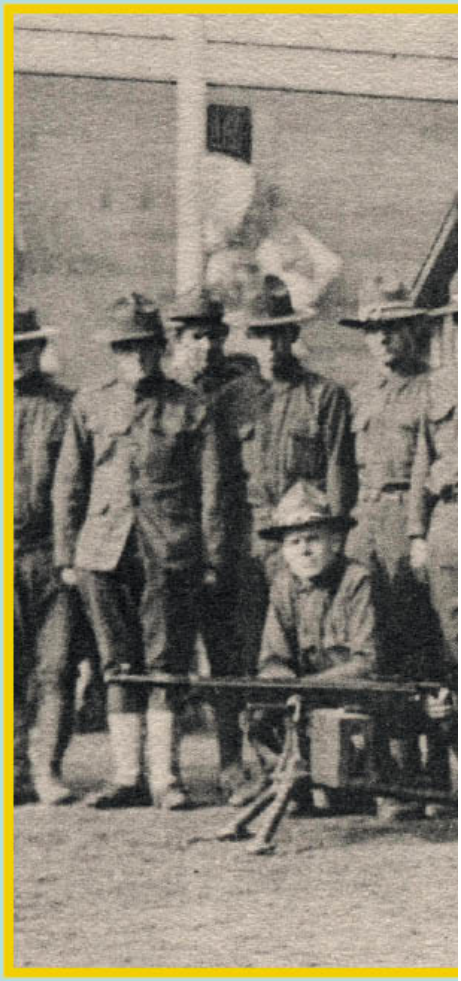
VINTAGE CAR

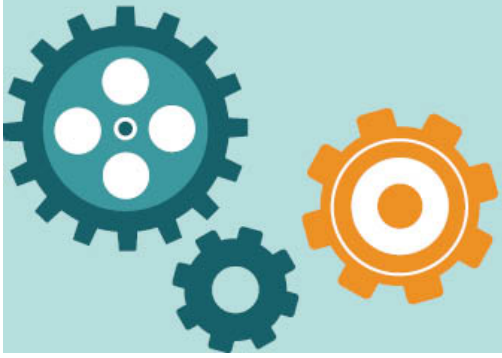
1908

Henry Ford perfects the assembly line process for building his new car, which he calls the Model T.

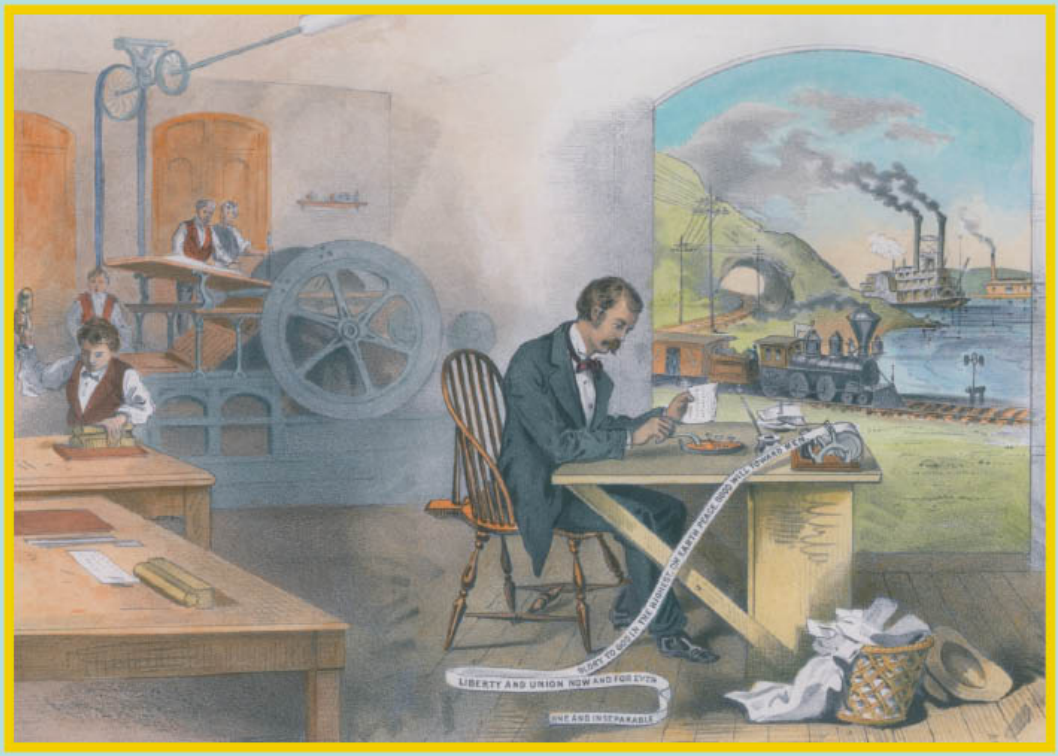
1914

World War I begins. This date marks the end of the era of the Industrial Revolution.





WORLD WAR I SOLDIERS

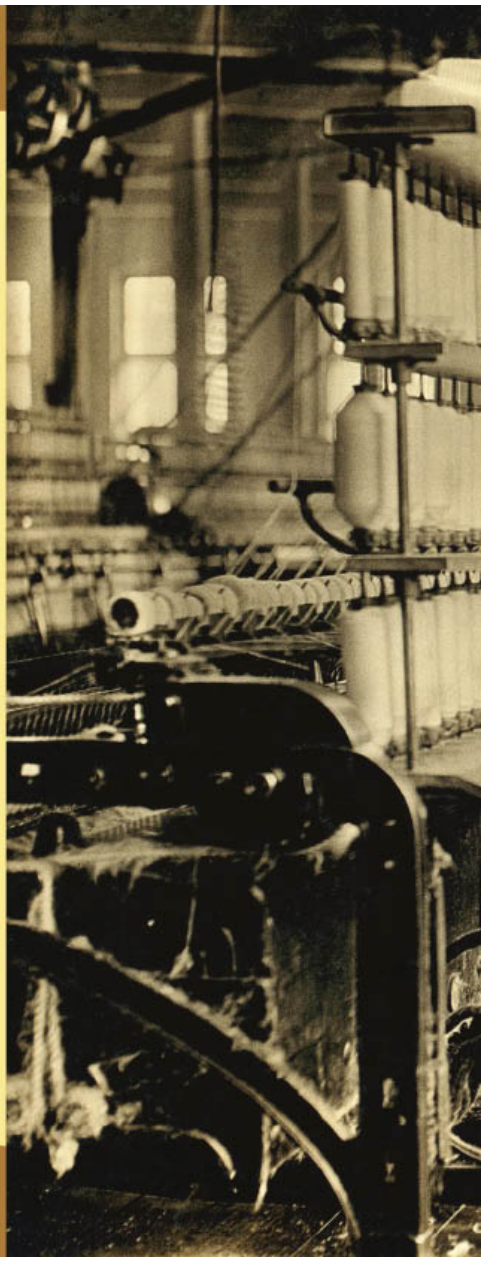

LIBERTY AND UNION NOW AND FOR EVER
ONE AND INSEPARABLE

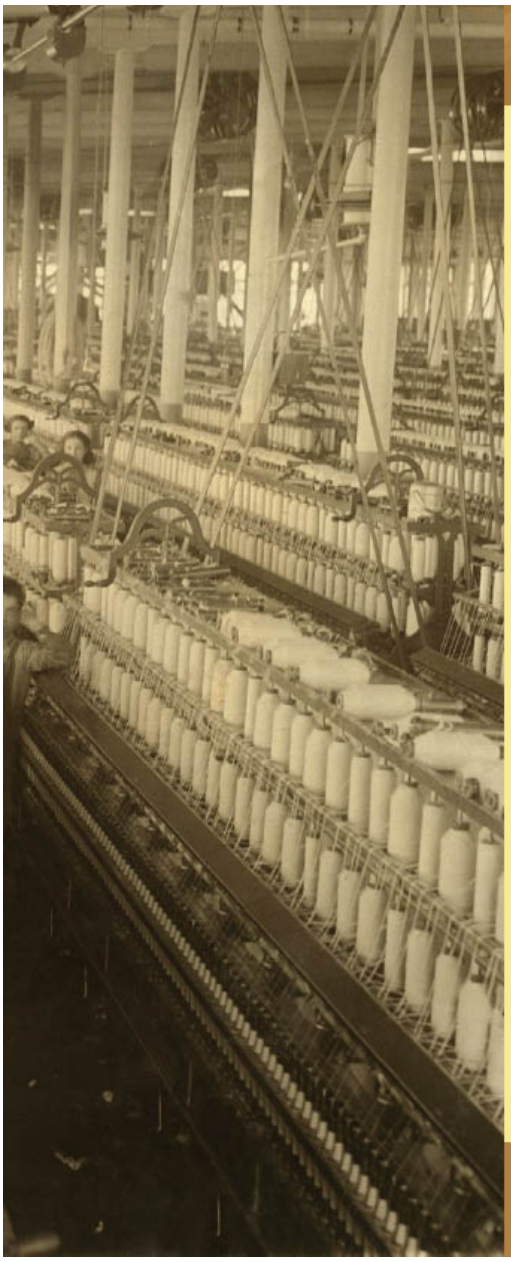
SUMMARY

The Industrial Revolution is the name given to an era when manufacturing of goods changed forever. Before this global change, products were created on farms and in cottage industries. Almost all the work was done by hand. However, during this era, the advent of new types of machinery revolutionized the way work was done. As new power sources were developed, huge factories sprung up in urban areas. Although conditions were not good for the workers, the efficiency of creating textiles and other types of products increased dramatically. Transportation and communication changed forever as well with the advent of the railroads, telegraph, and telephone.


CHILD LABOR LAWS

During the Industrial Revolution, children from impoverished families often had to get jobs to contribute income to their households. It's difficult to believe this today, but children who were only four years of age were some of the youngest workers in factories. At that time, factories were very dangerous places.

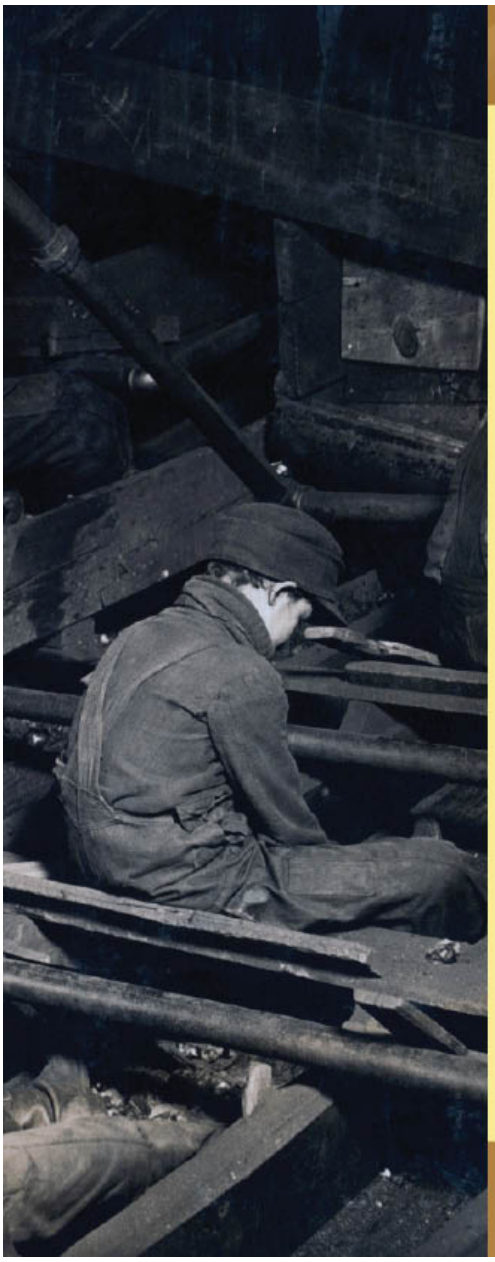




The machines in factories were new, but they hadn't always been tested for safety. The practice of using children for part of the labor force continued throughout the Industrial Revolution. Finally, in the 1900s, laws were passed to prevent young children from working long hours in unsafe conditions.

WHAT TYPES OF JOBS DID CHILDREN HAVE?

Children had all different types of jobs. They operated machines in factories and cleaned out chimneys. Sometimes employers preferred to hire kids instead of adults because they could squeeze into smaller spaces. There were three types of jobs that were very common—breaking up coal, creating matchsticks, and offering newspapers for sale on street corners.



BREAKER BOYS

Breaker boys had horrible jobs. They worked in the depths of the mines. The bulk of their jobs was to divide the huge hunks of coal as they traveled down conveyer belts. The coal had to be separated into equally sized chunks. It was also their job to take out anything that wasn't coal, such as soil, rocks, or clay. They had to do this by hand. The coal mine was dark and the air inside was toxic.

The breaker boys would sit all day, sometimes for 10 hours or more, on hard wooden stools to separate the coal pieces with their hands. They didn't have protective gloves and the sharp pieces inside the coal would wound their hands.


4114

Over time, many had asthma or sometimes they developed cancer in their lungs and throats from the toxic dust in the mines. Other common injuries included the loss of limbs or fingers from the unsafe conveyor belts. Most breaker boys were between the ages of 8 and 12.

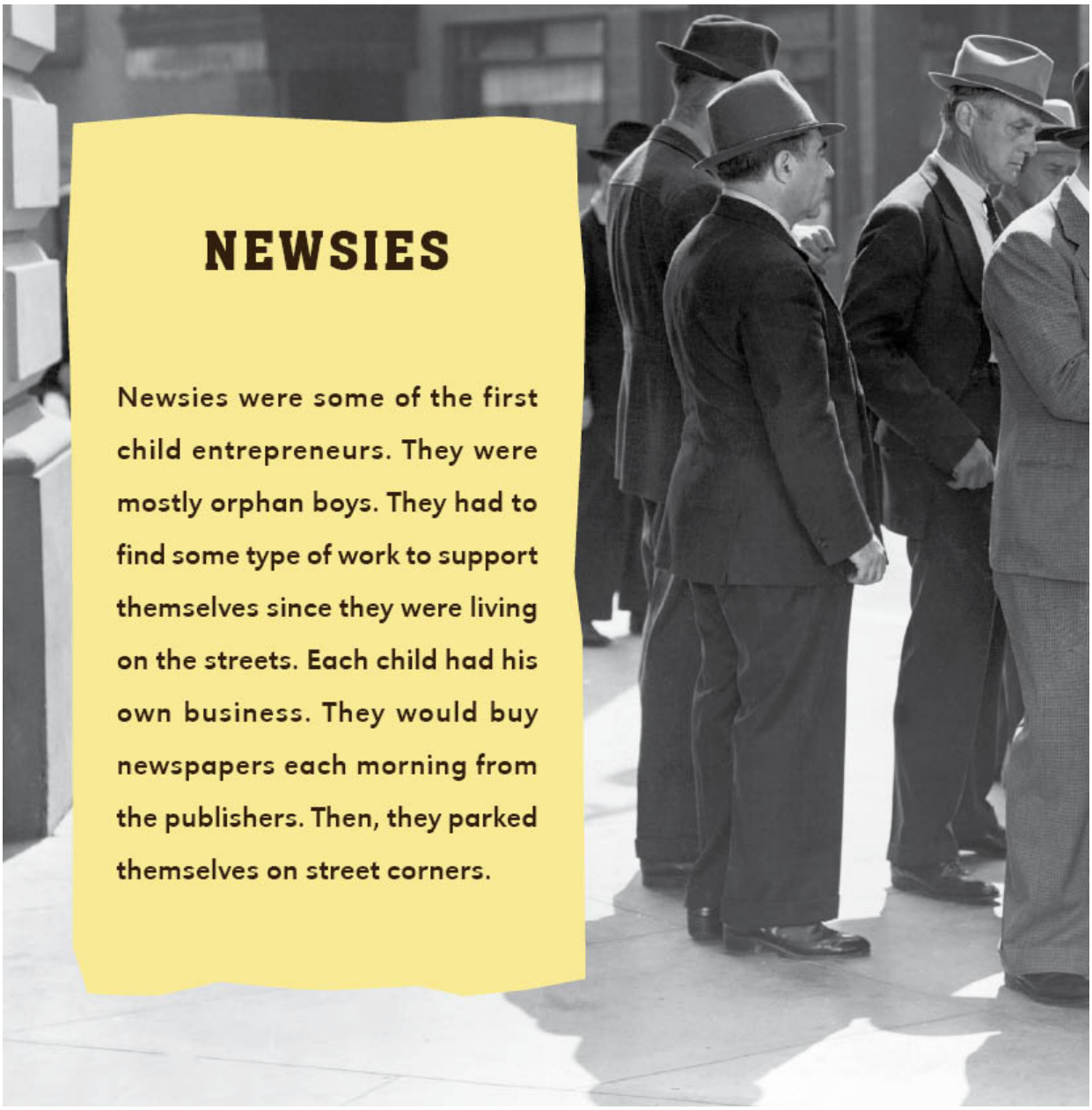
MATCHGIRLS

A majority of the workers laboring in the factories that produced matches were female and it was a common job for girls from ages 13 through 16. They were described as "matchgirls." One of the tasks in the factory was the step of creating the tips of the matches. In order to do this, they had to dip the sticks into a toxic chemical known as phosphorus.

The work was tedious, difficult, and dangerous. The young girls stood sometimes for 12 hours in succession and the wages were barely enough to buy food. If they didn't perform well, their employers would sometimes beat them for punishment. At times they had their fingers cut off by the machinery they were using.

The phosphorus was by far the deadliest part of their job. Breathing it caused illness and the chemical was so toxic that it broke down the enamel of their teeth and made their teeth fall out.

MATCHGIRL STRIKERS



NEWSIES

Newsies were some of the first child entrepreneurs. They were mostly orphan boys. They had to find some type of work to support themselves since they were living on the streets. Each child had his own business. They would buy newspapers each morning from the publishers. Then, they parked themselves on street corners.

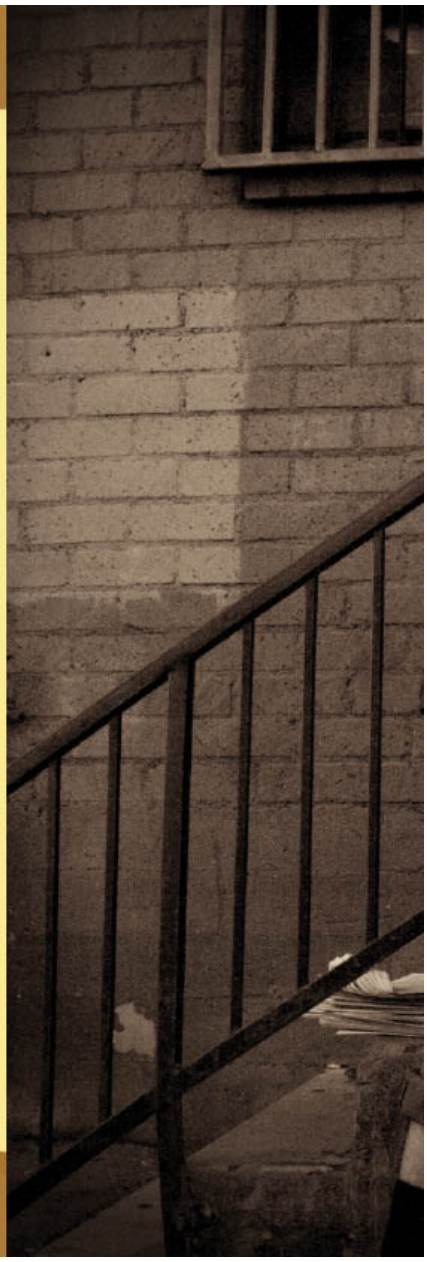
The corners with heavy street traffic were coveted. They called out to pedestrians to buy papers and sold as many as they could. If they sold all their papers, they would make a small profit and have enough to reinvest the following day. Sometimes if they didn't sell enough they lost money and couldn't eat.

In the year 1899, many publishers in the city of New York decided to increase their prices, which of course meant that the newsies had to pay higher prices too. The boys joined together and decided to strike. They did everything they could do to make it impossible for the publishers to sell their papers.

Finally, they brought the publishing management to their knees, and a compromise was worked out between the adult management and the young boys. The publishers didn't decrease their prices. However, they did agree to purchase any papers that the boys couldn't sell.

One of the kid strike leaders was named Kid Blink because he wore a patch over his blind eye. In those days, going without newspapers would be the same as stopping all television and internet today.

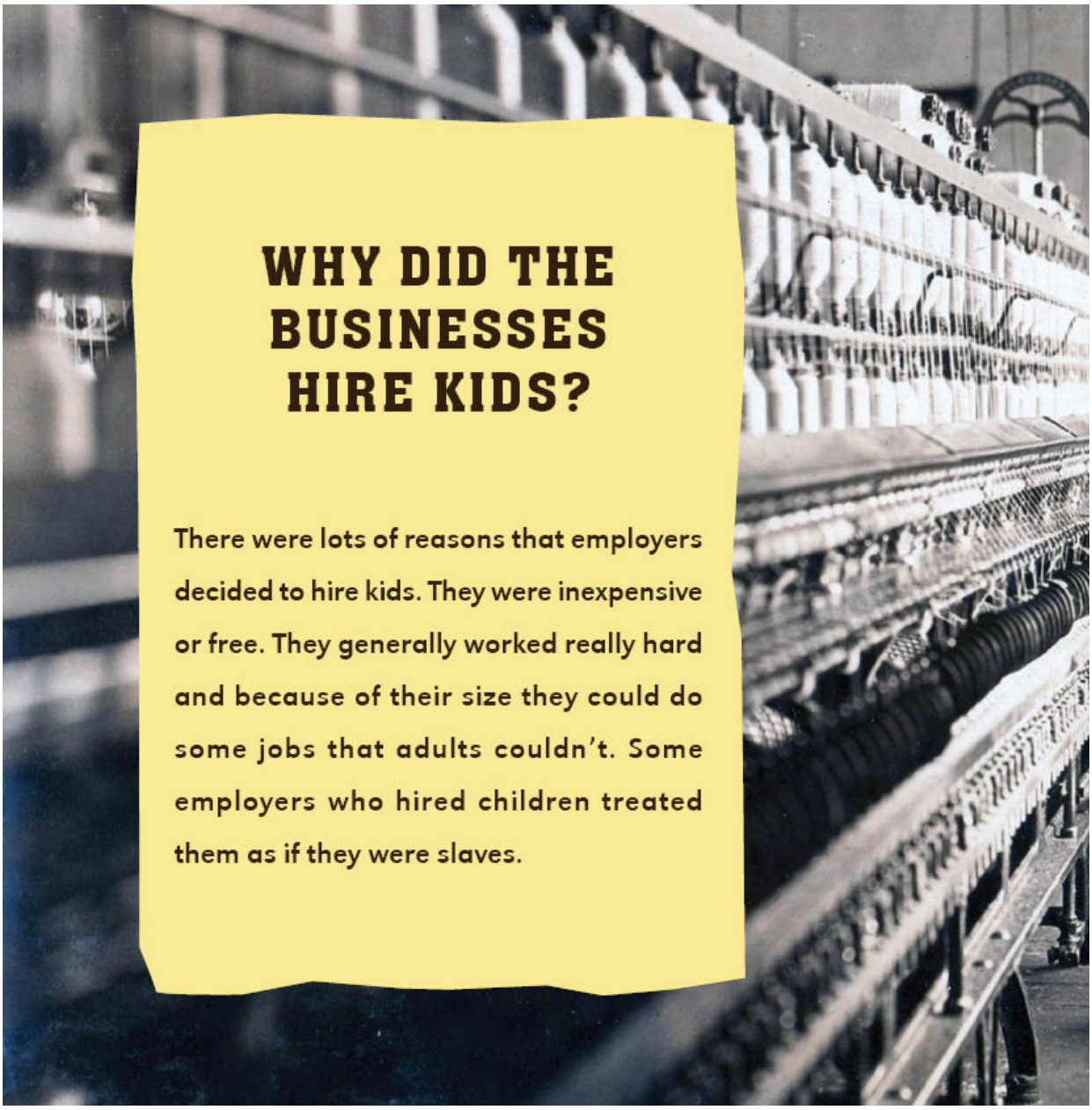
Kid Blink and the other kid leaders became some of the most powerful kids in history due to their bravery and their ability to get management to listen to their demands. The Walt Disney company created a movie about this real-life event in 1992 that was entitled "Newsies." In 2012, a musical about the Newsies was performed on Broadway and ran for over five years.




BEAVER
VULCANITE
M. R.
BOARD KEEPS

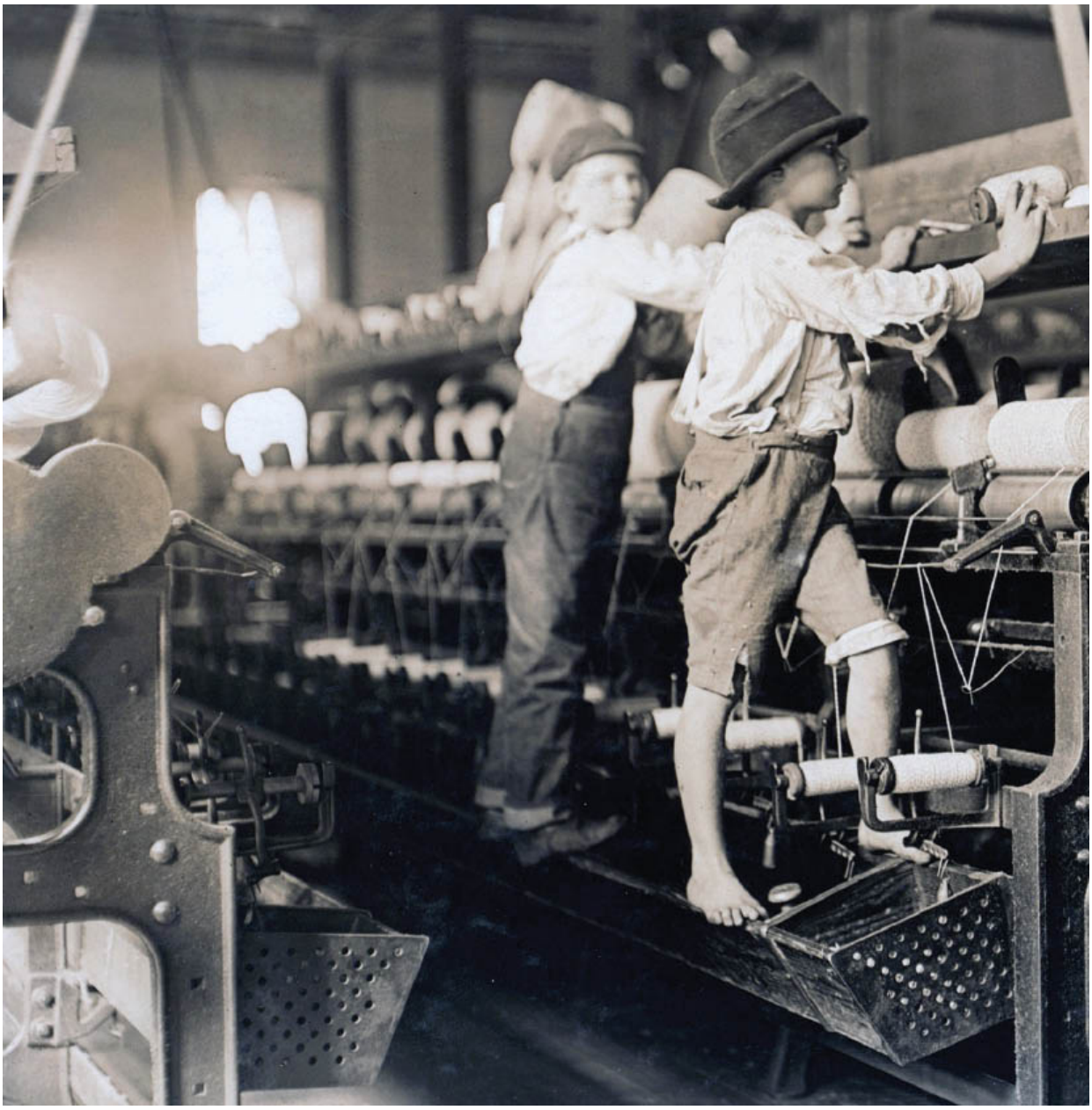
HOW MUCH MONEY DID CHILDREN RECEIVE FOR THEIR LABORS?

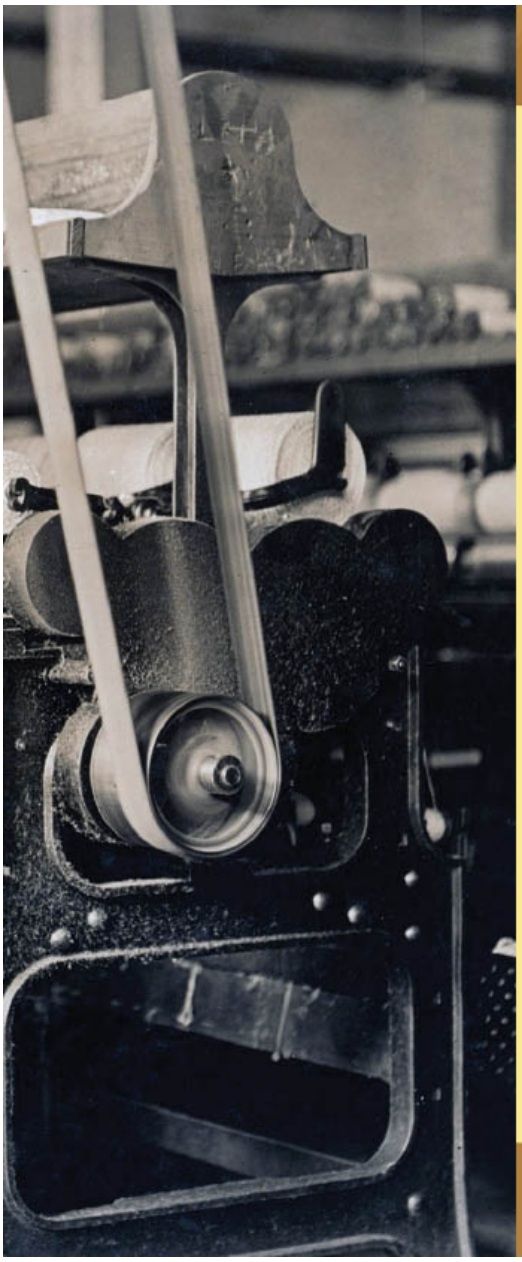
Another reason that employers preferred hiring child workers was because they didn't have to pay them as much as adults. Sometimes they didn't receive any pay at all, but were simply given shelter. If they were paid, it was generally at 10-20% of the amount that the adults were paid for the exact same task.



WHY DID THE BUSINESSES HIRE KIDS?

There were lots of reasons that employers decided to hire kids. They were inexpensive or free. They generally worked really hard and because of their size they could do some jobs that adults couldn't. Some employers who hired children treated them as if they were slaves.

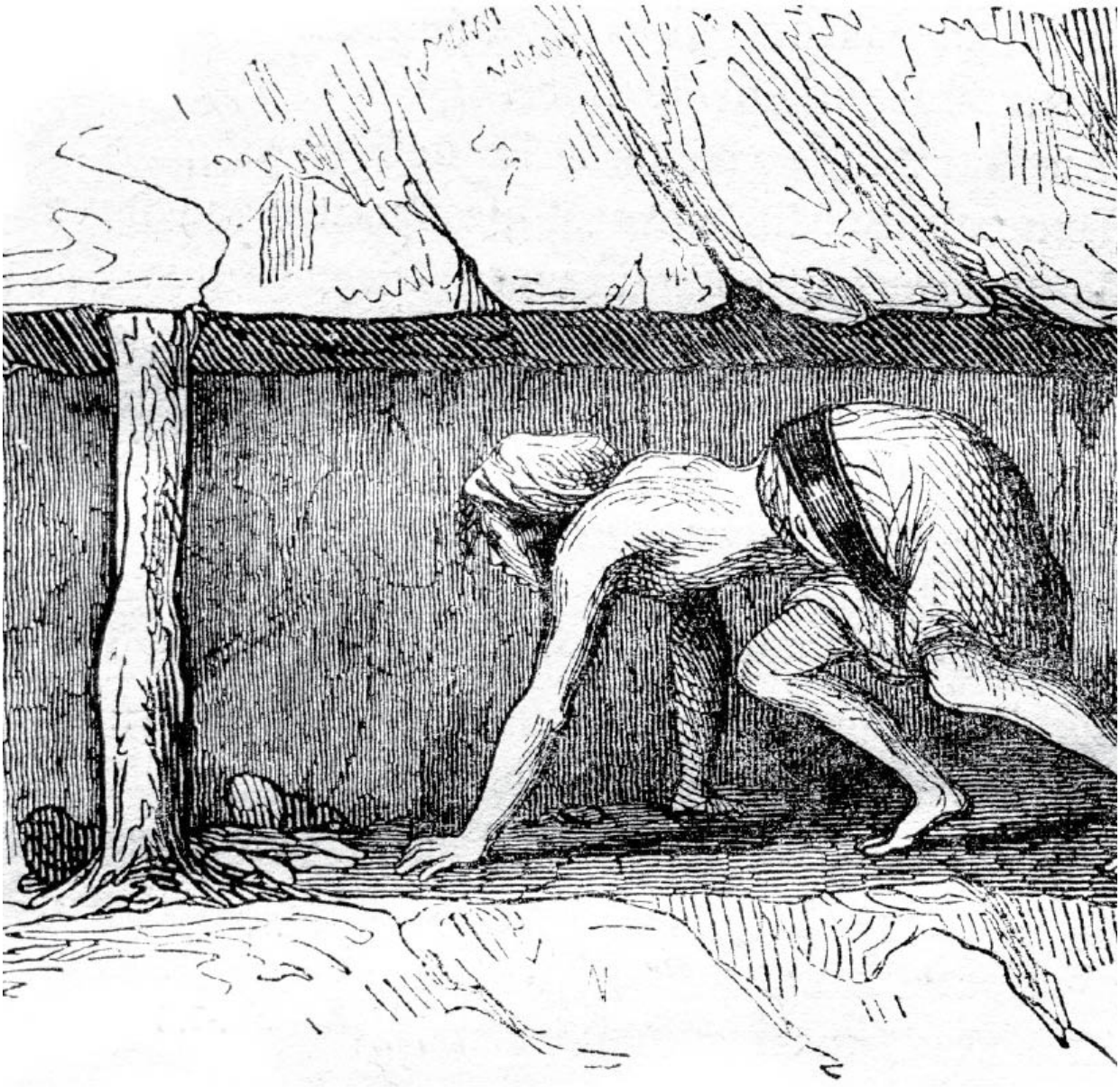


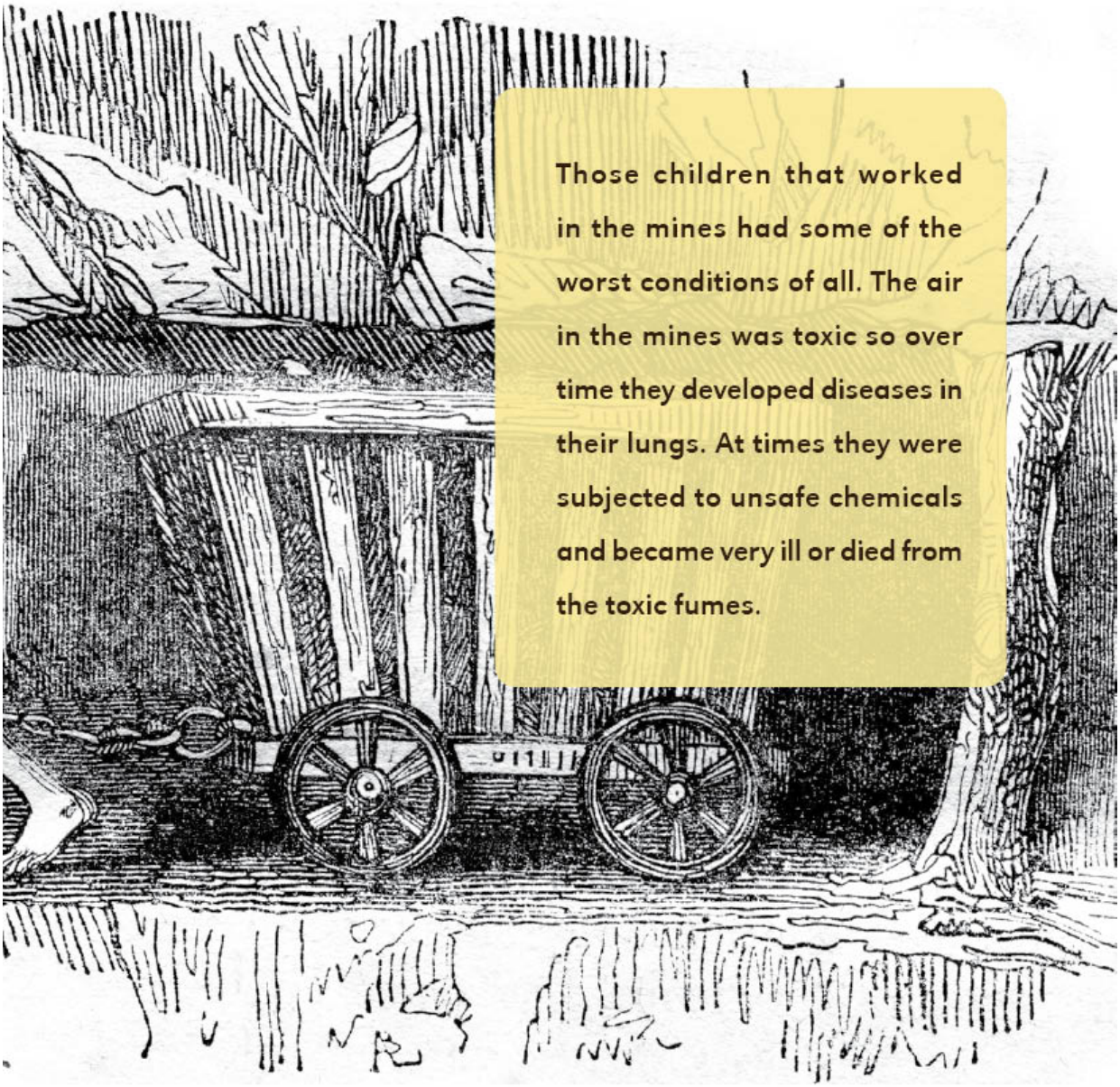


They were locked in their quarters and forced into working very long days. Other businesses hired kids because they knew there was a likelihood that they might starve on the streets if they weren't hired.

WHAT WERE THE WORKING CONDITIONS?

Many children died or were injured during the dangerous working conditions of the Industrial Revolution. There were almost no regulations or laws about protection from overwork or dangerous conditions. Many children weren't trained well on the machines they had to use so their fingers or limbs were cut off.





Those children that worked in the mines had some of the worst conditions of all. The air in the mines was toxic so over time they developed diseases in their lungs. At times they were subjected to unsafe chemicals and became very ill or died from the toxic fumes.

WAS CHILD LABOR A COMMON PRACTICE?

Child labor was very common throughout this era of history. In Britain, over half of the workers in factories at the start of the 1800s were 14 years of age or younger. In 1870 in the US, over 750,000 workers were less than 15 years of age.

AN END TO CHILD LABOR

One of the first laws regulating child labor was passed in Britain in 1833. This law made it illegal for children under 9 years of age to be hired. In the US, the government began to regulate child labor at the beginning of the 1900s. Many businesses opposed these regulations since their profits were dependent on hiring children.

Some families were upset about the regulations too since they needed the income that the children earned. However, the government went forward to protect children and in 1938, a group of laws was passed called the Fair Labor Act. It provided limitations on the hiring of children, established a minimum wage, and also created limits for the number of hours for a standard workday.


684.15
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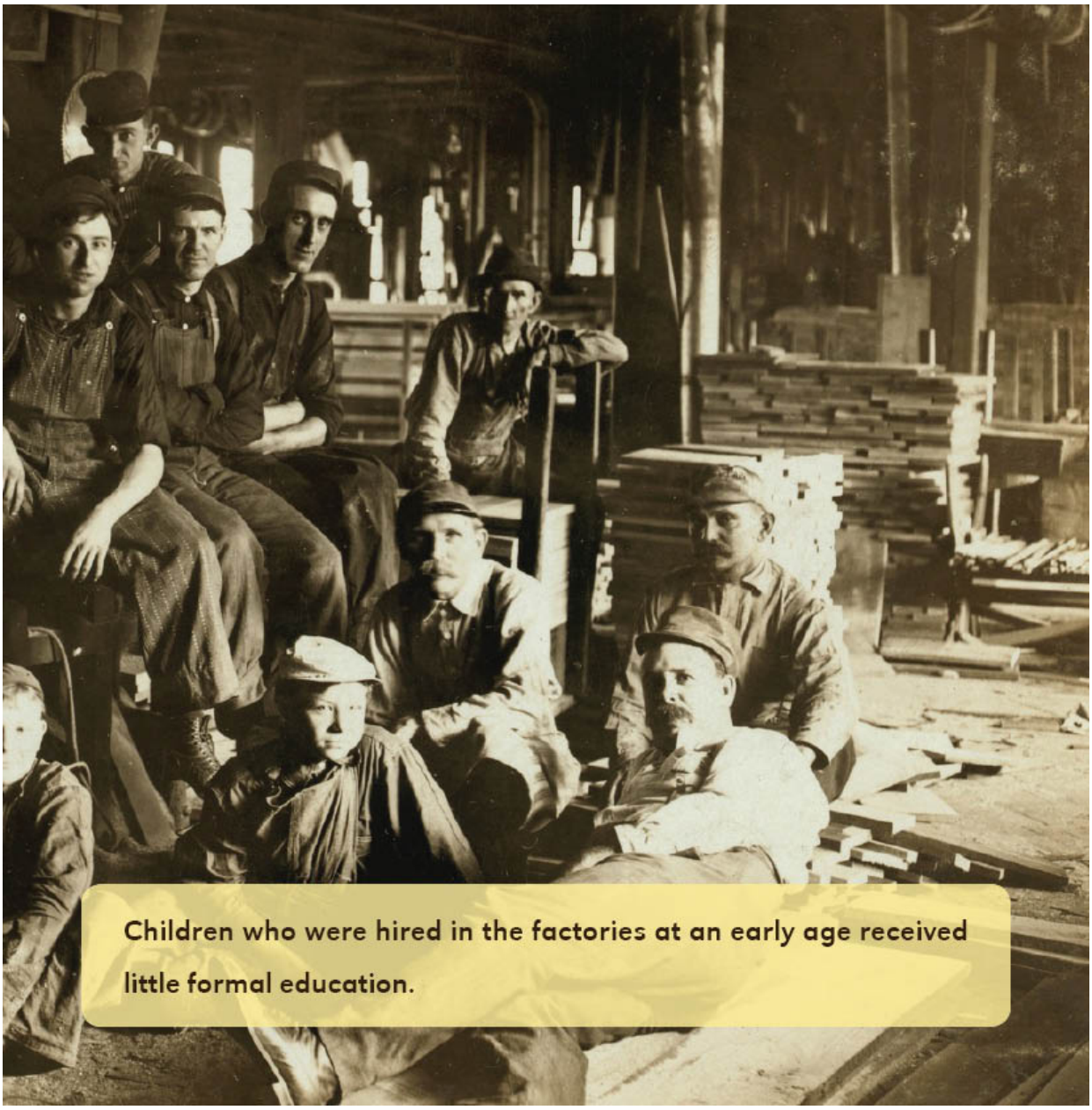
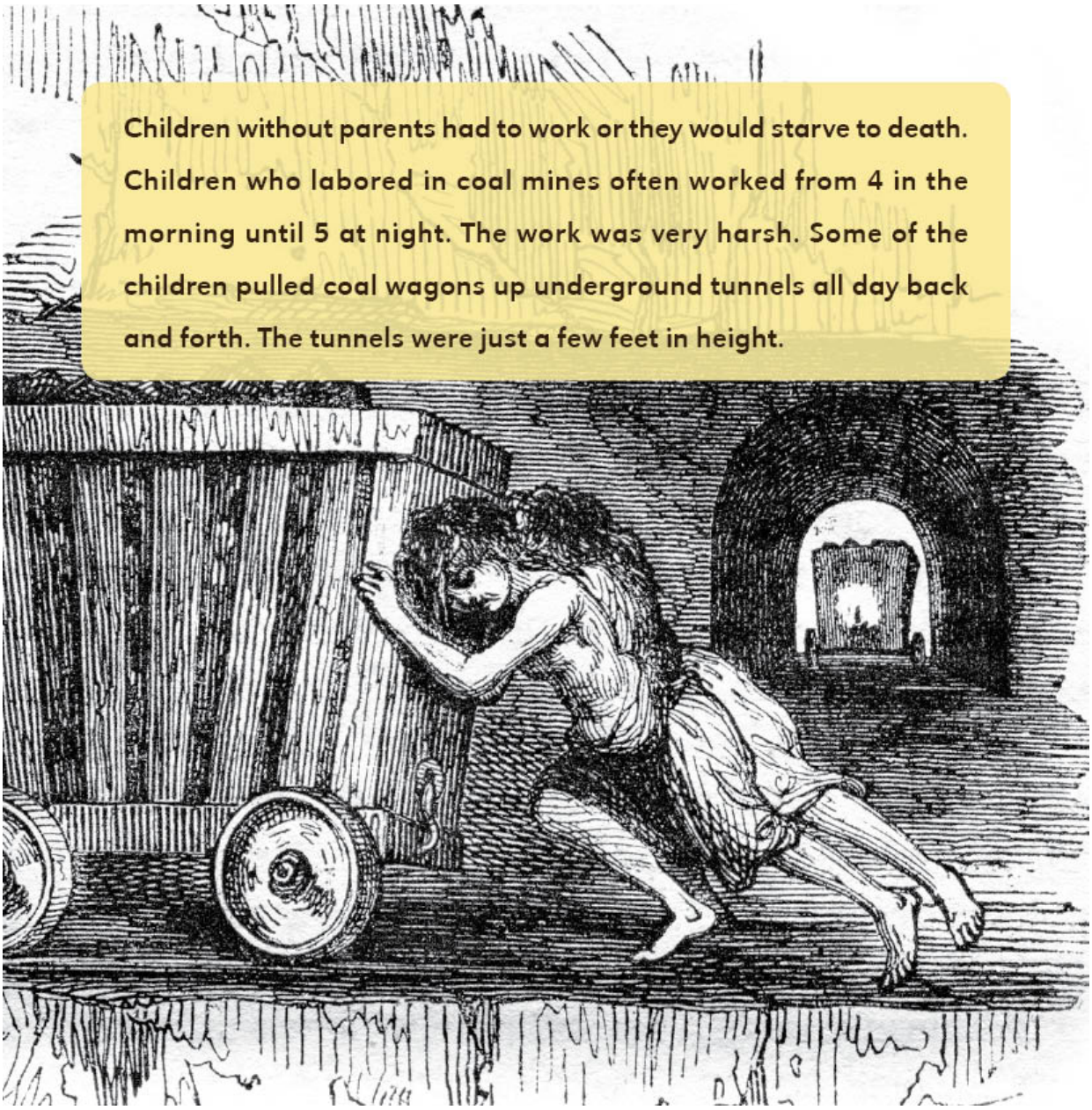
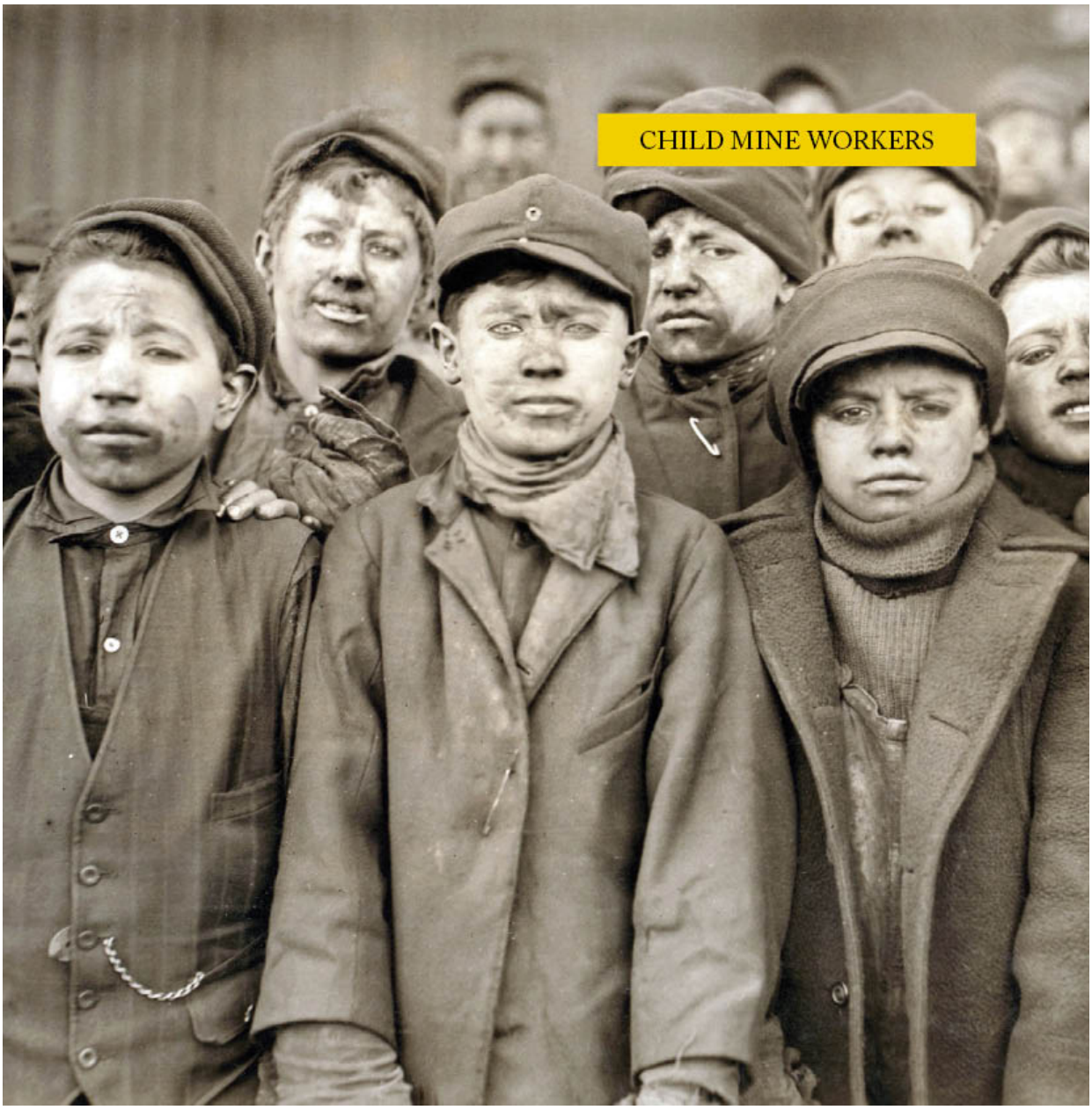


Children who were hired in the factories at an early age received little formal education.



Children without parents had to work or they would starve to death. Children who labored in coal mines often worked from 4 in the morning until 5 at night. The work was very harsh. Some of the children pulled coal wagons up underground tunnels all day back and forth. The tunnels were just a few feet in height.


CHILD MINE WORKERS

A photo taken by Lewis Hine showed the deplorable conditions of the Breaker Boys at a coal mine in Pennsylvania. It brought the situation to the public and helped the cause for child labor laws. In London, thousands of girls working in the match factories took to the streets in the year 1888 to protest their terrible working conditions.

TIMES WERE CHANGING

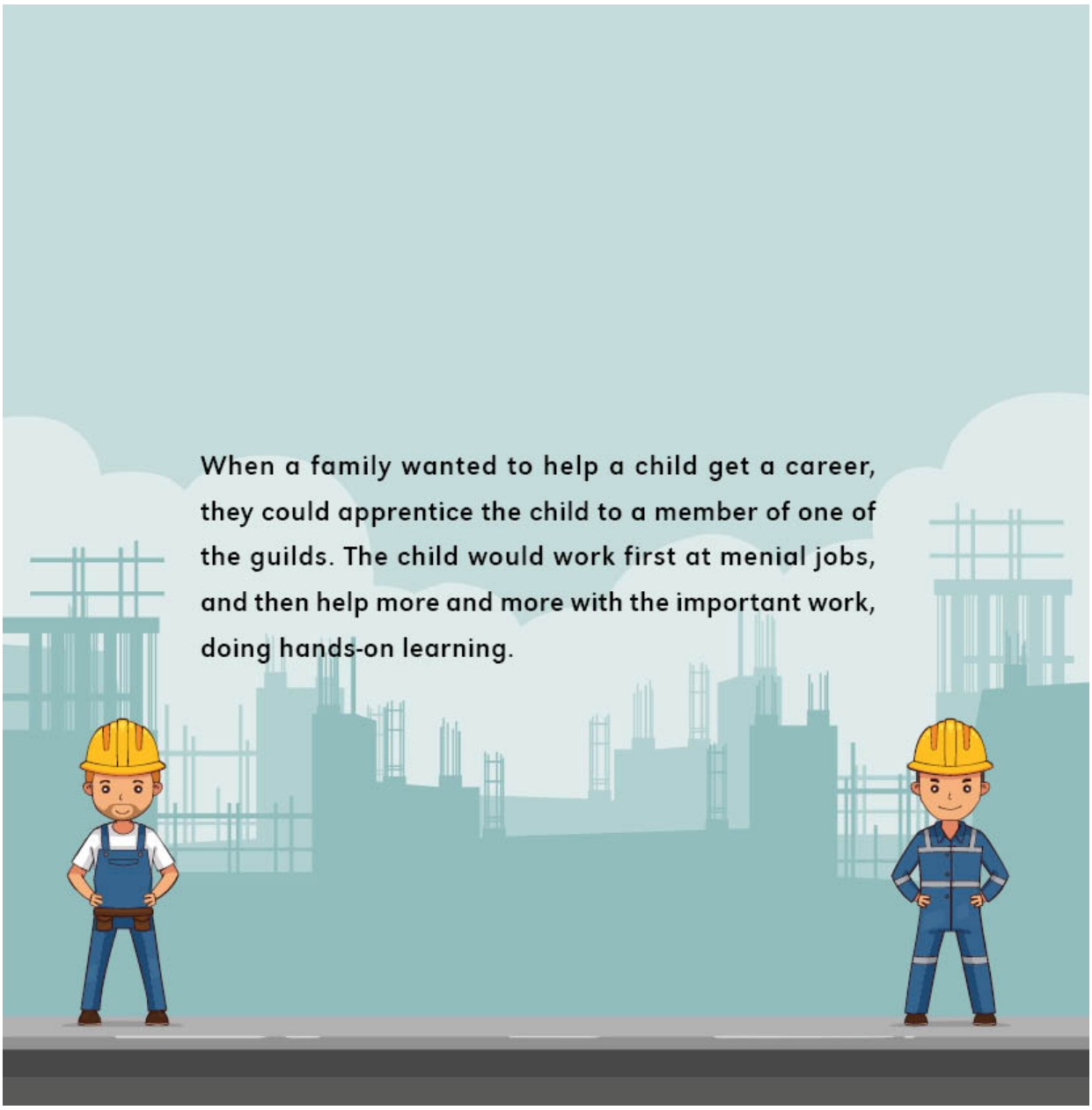
During the Industrial Revolution, children and teenagers represented over half of the labor force in Britain's factories at the beginning of the 1800s. In the United States in the 1870s over 750,000 children and teenagers were working in factories and other businesses.

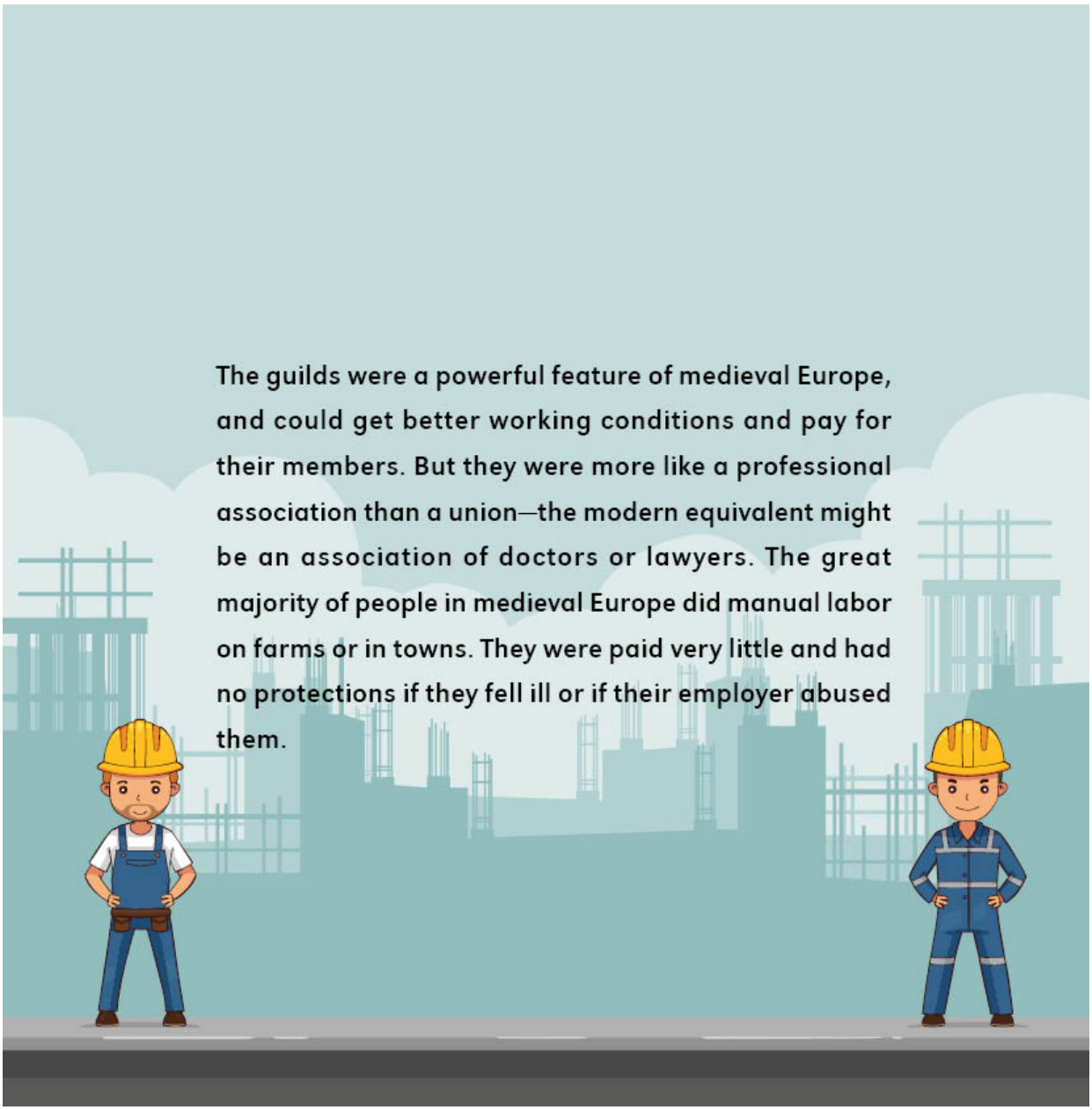
It wasn't until the early 1900s when regulations and laws were passed to ensure the safety and health of children and limit the age when they could be hired and the hours they could work.

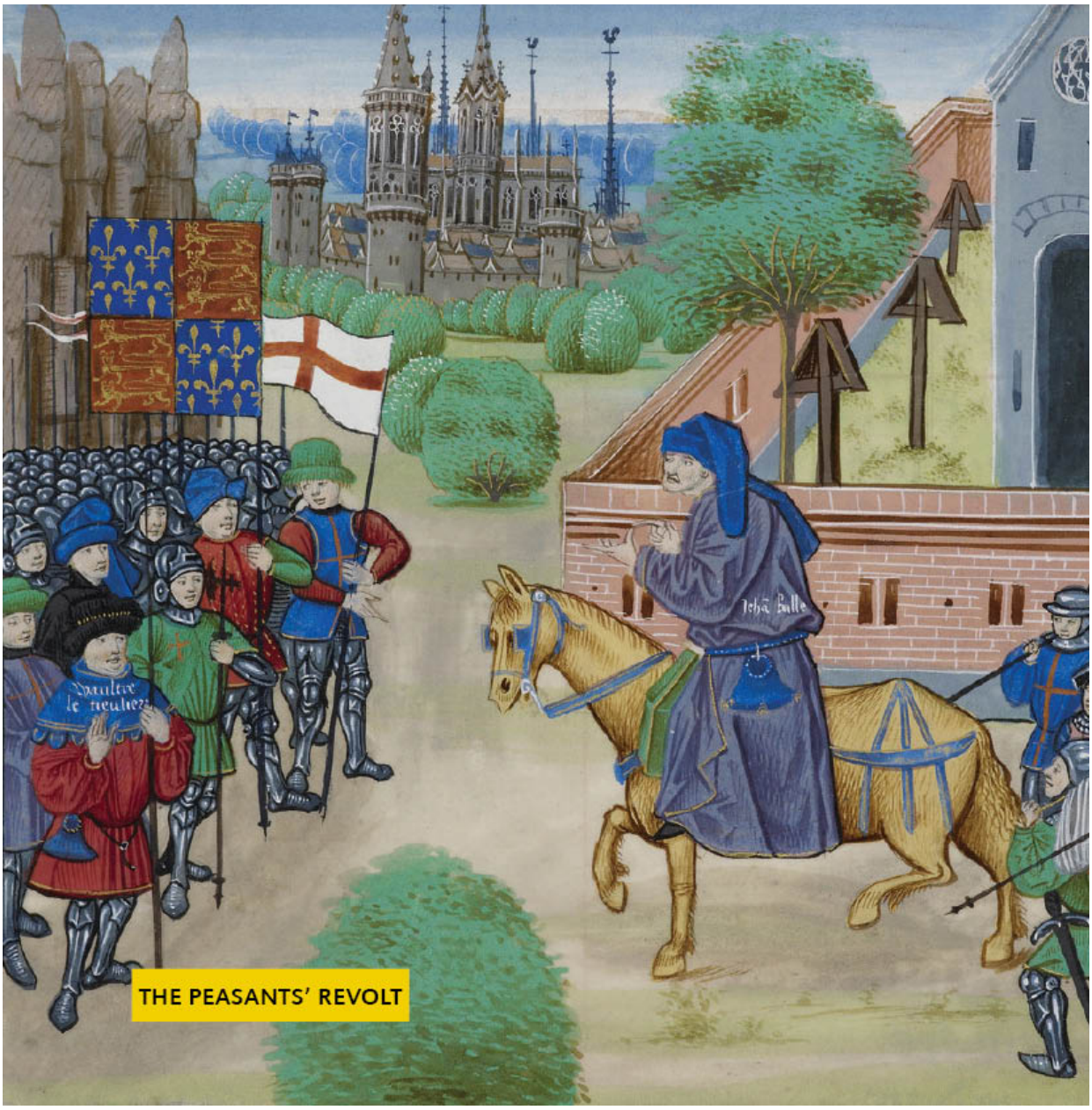

LABOR UNIONS

EARLY LABOR GROUPS

Medieval craftsmen were the only workers in Europe with organizations, which were often called guilds, and they were both a social society and a training system for people who worked in a particular skilled trade. A town might have a guild for weavers, one for leather-makers, and so on. Each guild might have its own meeting-place to hold feasts and other events. The guild would guard trade secrets, such as special formulas, and pushed governments to protect their products from competition with goods made in other countries.


When a family wanted to help a child get a career, they could apprentice the child to a member of one of the guilds. The child would work first at menial jobs, and then help more and more with the important work, doing hands-on learning.


The guilds were a powerful feature of medieval Europe, and could get better working conditions and pay for their members. But they were more like a professional association than a union—the modern equivalent might be an association of doctors or lawyers. The great majority of people in medieval Europe did manual labor on farms or in towns. They were paid very little and had no protections if they fell ill or if their employer abused them.

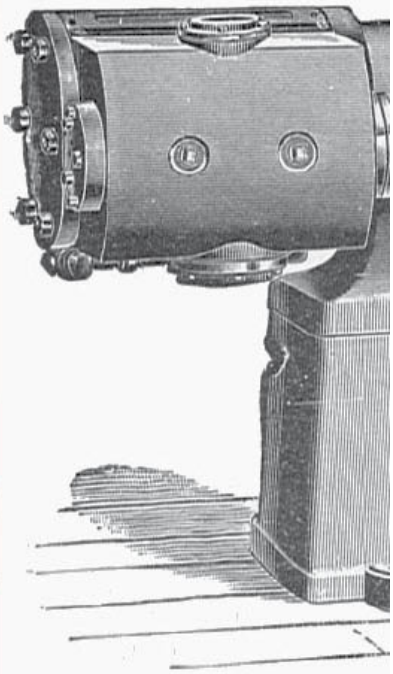


THE PEASANTS' REVOLT

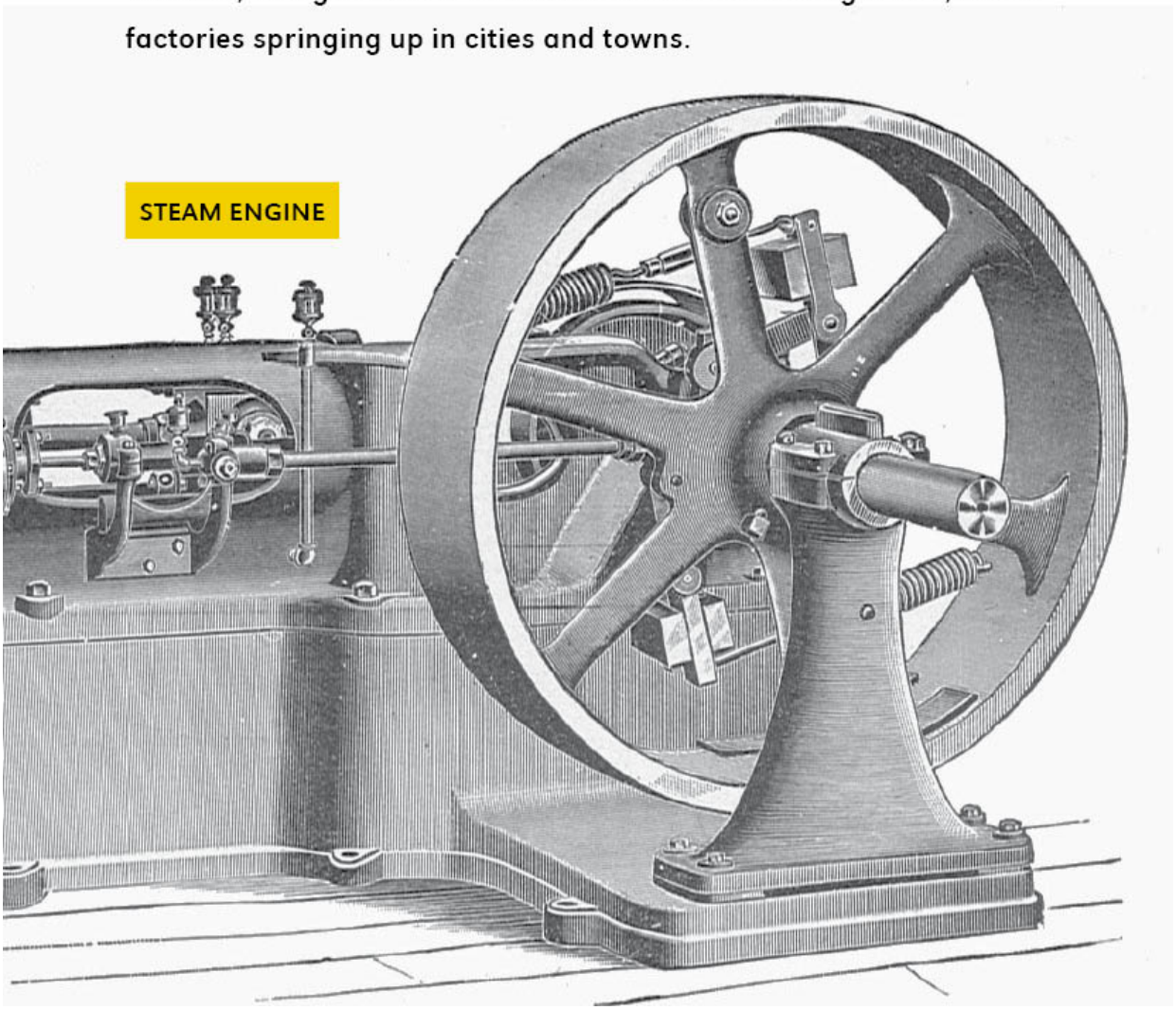
Periodically, workers rose up to try to win better conditions for themselves. In 1381 most of England experienced the Peasants' Revolt, also known as Wat Tyler's Rebellion after one of its leaders. A court official tried to collect some unpaid taxes in a high-handed way. Workers, and even leaders of town governments, joined in an armed rebellion. The goals of the rebellion were lower taxes and an end to serfdom, the system of unpaid labor under which most English farm laborers worked. The revolt was put down with violence, and several thousand people died in the fighting.

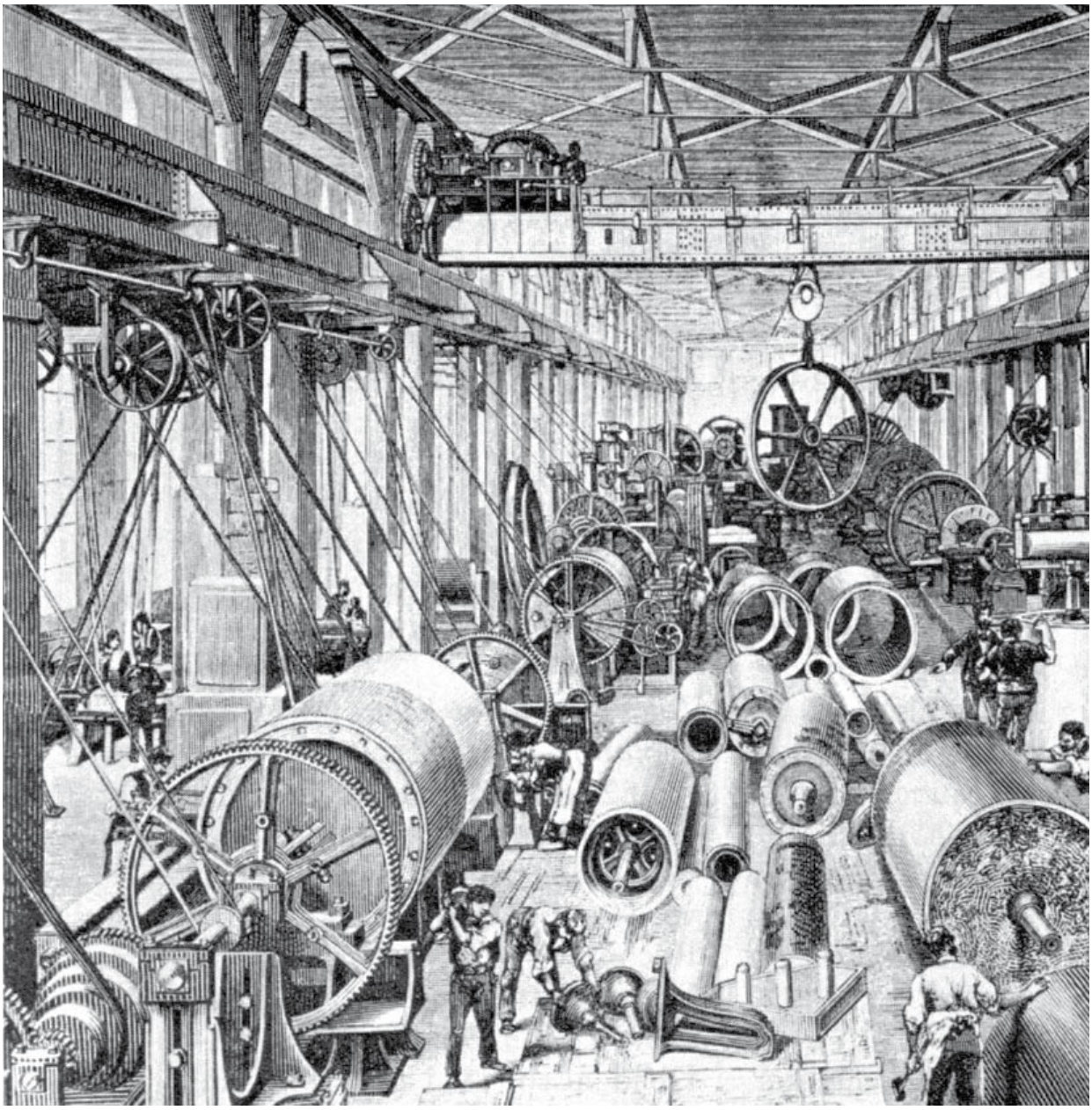
LABOR AND THE INDUSTRIAL REVOLUTION

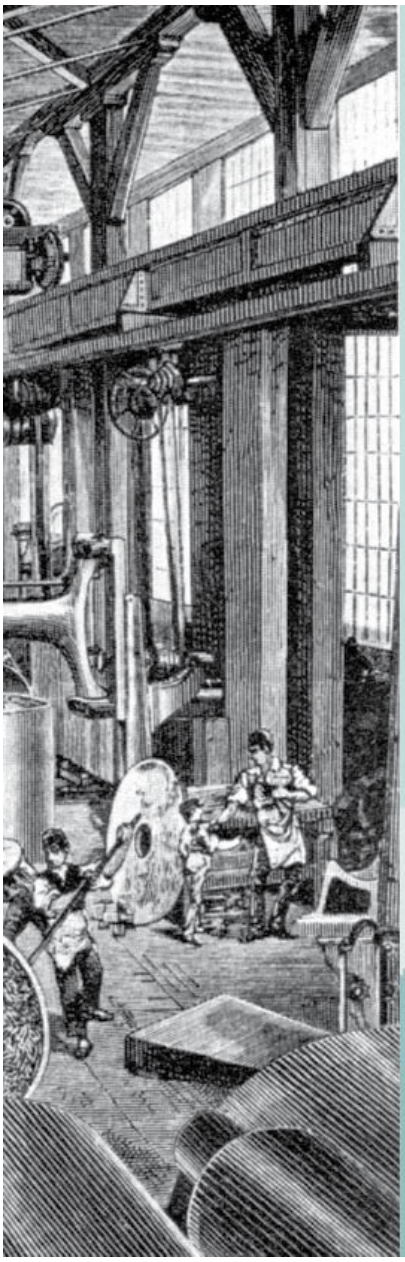
However, not much changed in the relationship between employers and laborers until the industrial revolution in the eighteenth century in Europe and the nineteenth century in North America.



Invention of energy sources like the steam engine and water-powered turbines, along with new tools like automated weaving looms, led to factories springing up in cities and towns.

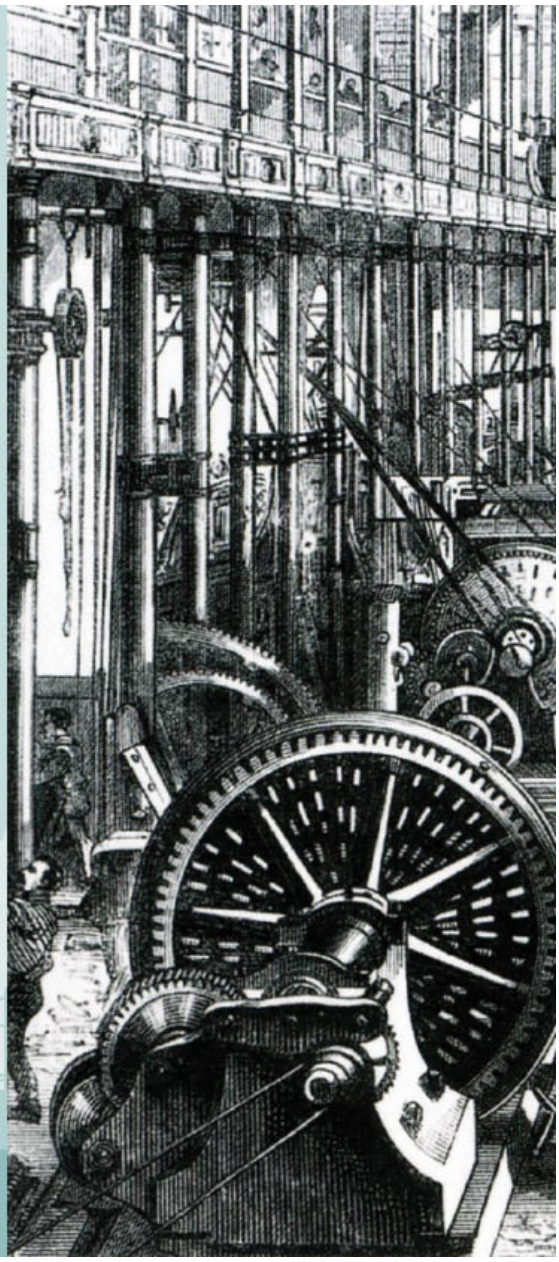


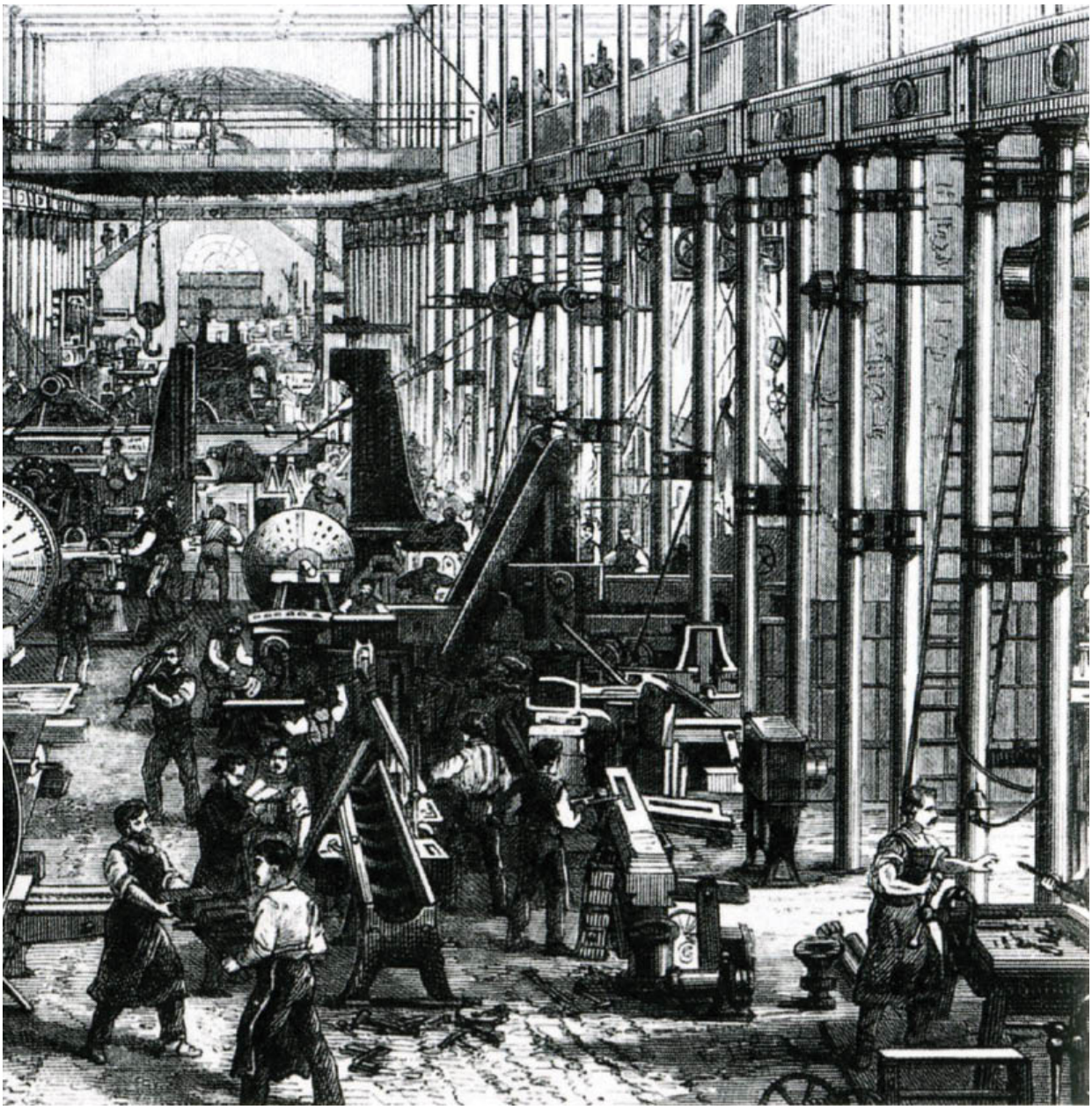


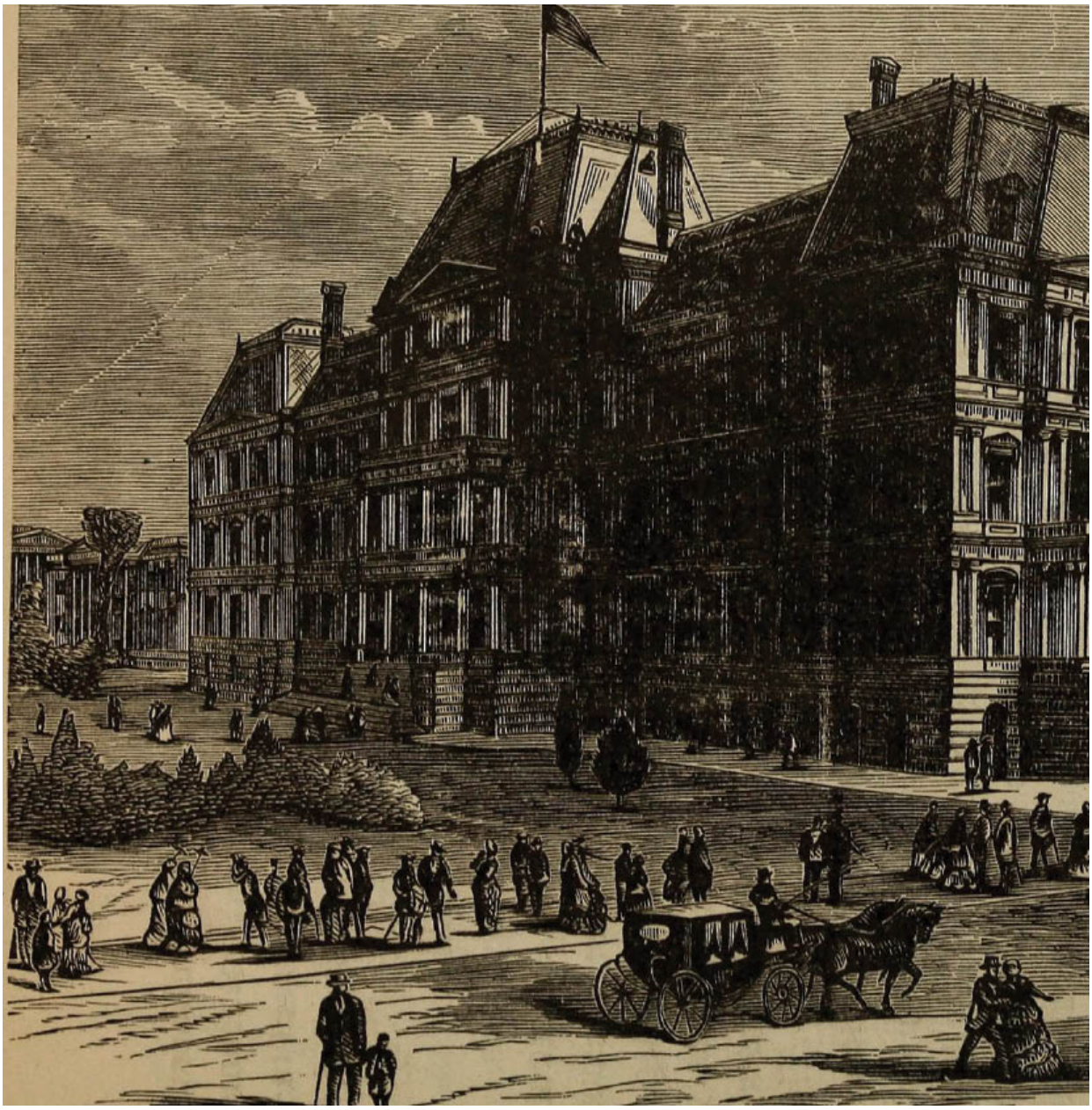


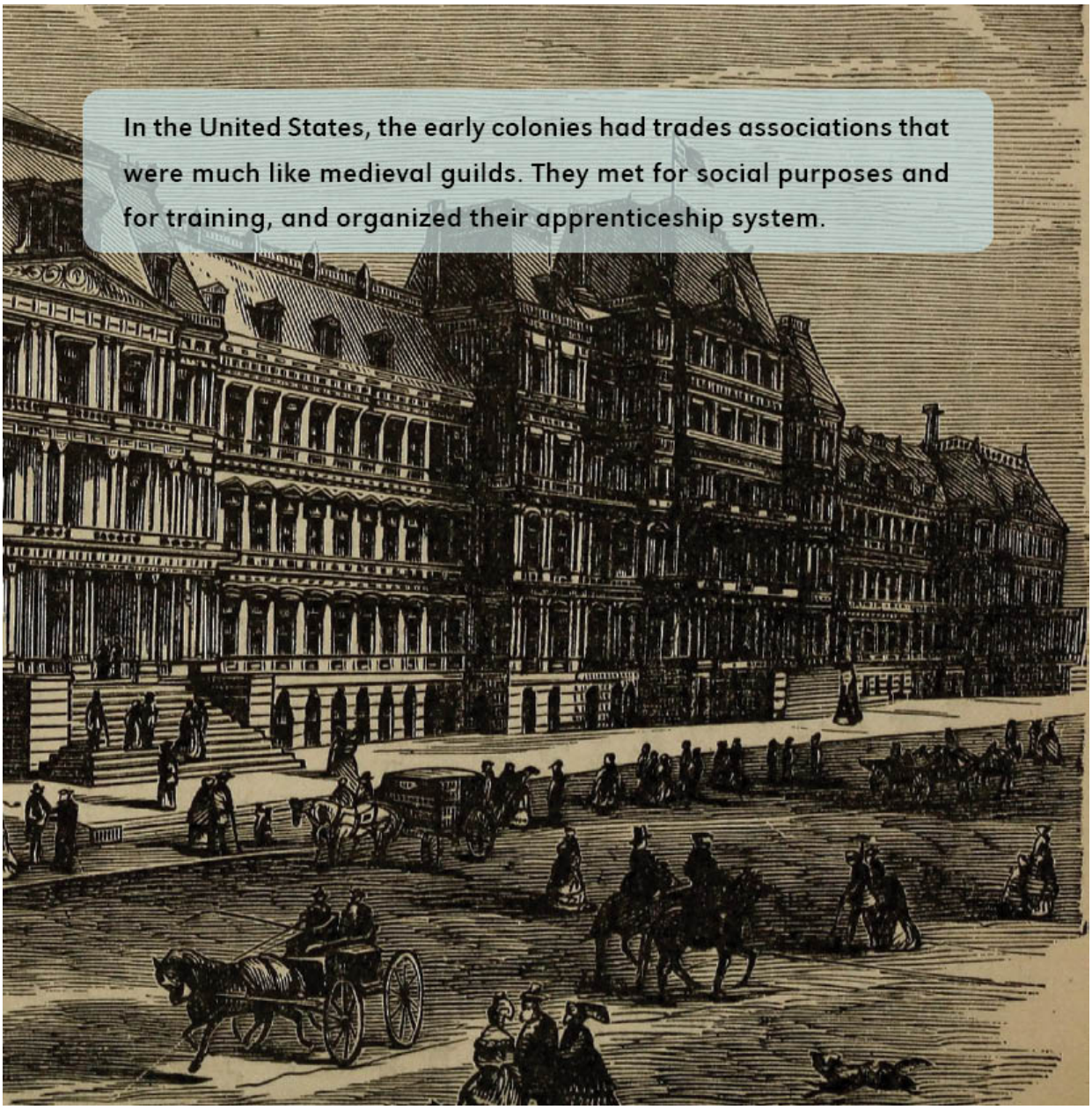
People who had done piece-work in their homes could now move to a town and get a job in a factory. Although the pay was low and the conditions were harsh, people's lives were often better and with more options than there had been when they were living in rural isolation, forced to work under one landowner.

As factory workers grew in number, they became essential to the manufacturing process. If the workers did not work, the machines could not run and the product would not be made. This gave the workers some ability to press for better working conditions, higher pay, and better treatment. The efforts were not always successful, as factory owners saw any gain by the workers as costly.

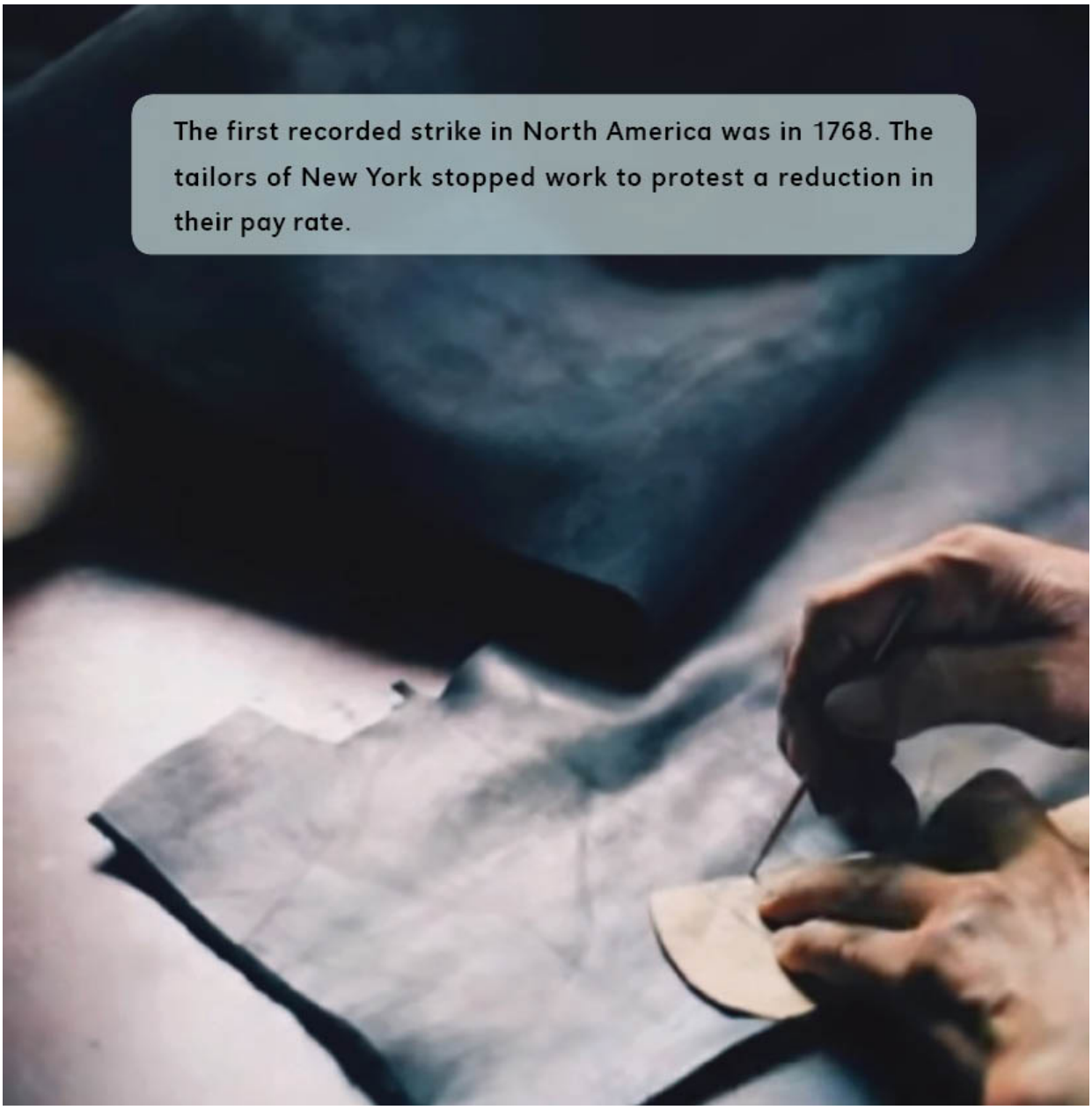


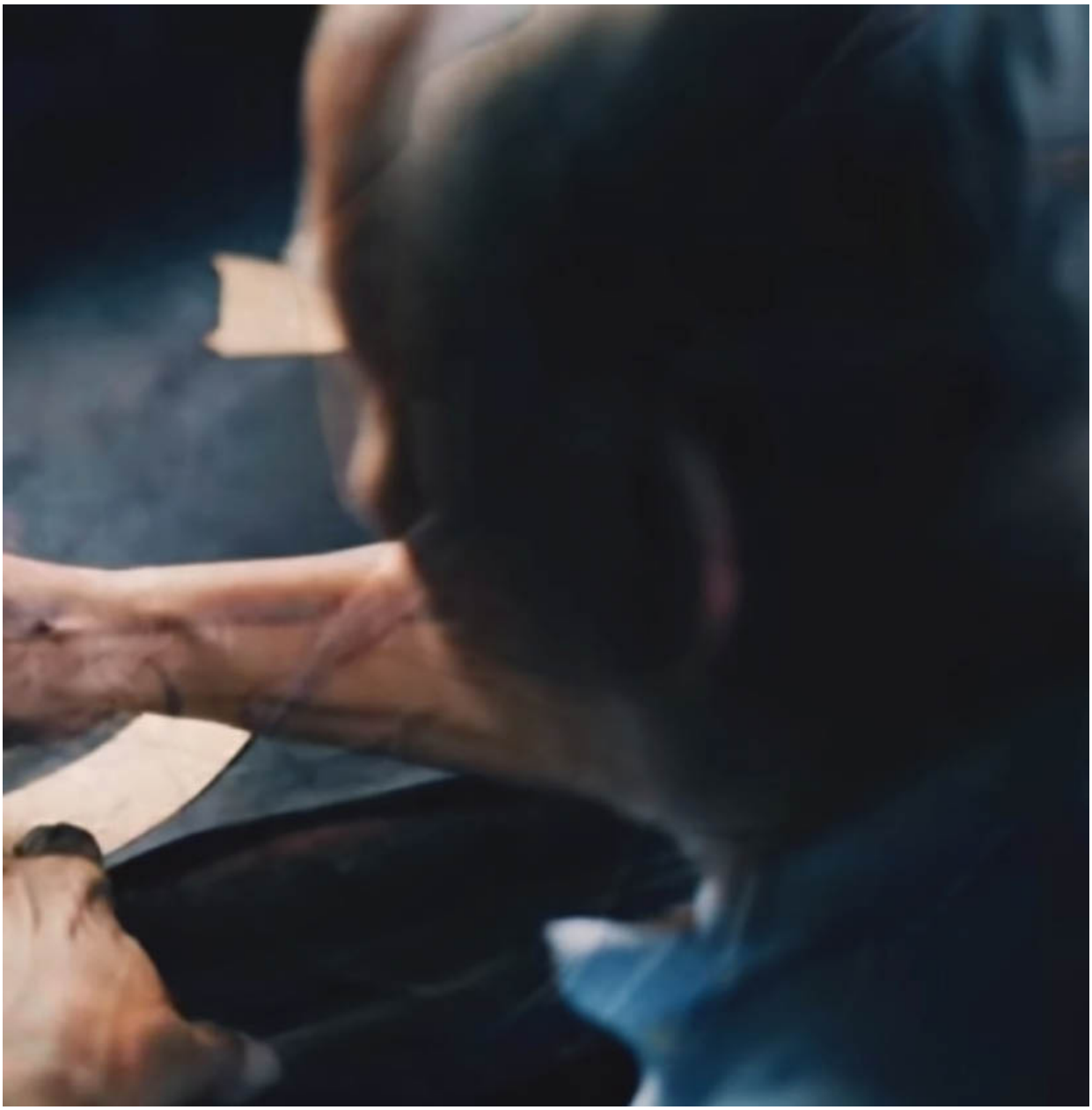






In the United States, the early colonies had trades associations that were much like medieval guilds. They met for social purposes and for training, and organized their apprenticeship system.

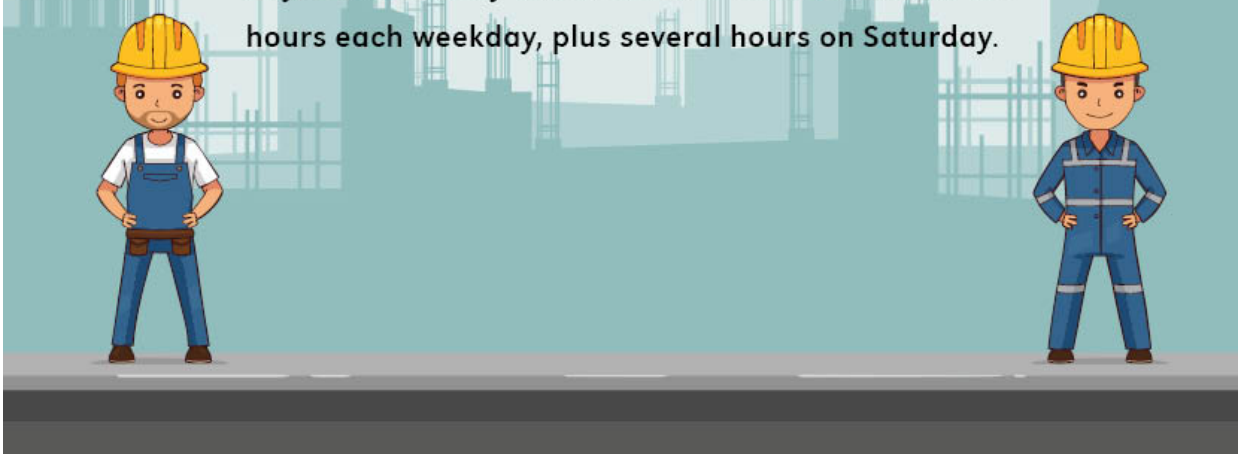

The first recorded strike in North America was in 1768. The tailors of New York stopped work to protest a reduction in their pay rate.




CORDWAINER

In 1794 in Philadelphia, shoemakers formed the Federal Society of Journeymen Cordwainers, the first union for American workers, as opposed to a guild or society for higher-trained specialists like lawyers.

From then, many local craft unions appeared in cities. Its members would publish standard prices for typical jobs they would do (so much to put a new sole on a boot, so much more to repair the leather where it is ripped, and so on). They defended their members and their products against the sale of cheaper goods made by less-skilled workers, and pressed for a shorter work day. The work day at the start of 1800 was about ten hours each weekday, plus several hours on Saturday.




SAAPAS

In 1827 the Mechanics' Union of Trade Associations, in Philadelphia, became a grouping and coordination body for the many unions that were emerging in the city. Soon the Mechanics' Union absorbed many smaller and less-useful unions, as well as providing a means for it and other large unions to share experiences and ideas.

Zwei tolle Tag

Ausschuß für Landesplanung beschloß:

Geldspritze für Harburgs Randgebiete

Acht Projekte werden gefördert

(Von Red.-Redakteurin Gisela Andreßen)

Winsen-Hamburg. Die Würfel sind gefallen: Der Ausschuß der gemeinsamen Landesplanung Hamburg Niedersachsen wird im Landkreis Harburg insgesamt acht Projekte fördern. Von den über fünf Millionen DM, die für die Hamburger Randgemeinden zur Verfügung stehen, erhält der Landkreis 1,413 Millionen DM. Sie sollen in erster Linie den Fremdenverkehr ankurbeln, von dem die Hamburger auch profitieren, wenn sie sich am Wochenende „Im Grünen" erholen.

Das sind die geförderten Projekte:

- Der Ausbau der Kläranlage in der Stadt Winsen sowie die Erweiterung der Sammelwasserkanäle in Stöckte.
- Der Ausbau von Rundwanderwegen und der Radwegen von Buchholz und Hanstedt.
- Die Errichtung von Landschaftsparkplätzen für die Gemeinden Hollenstedt, Asendorf, Neu Wulmstorf und Buchholz sowie der Bau von Erholungseinrichtungen für die Gemeinden Harburg und Egestorf.
- Der Ausbau eines vorgesehenen Freizeitzentrums im Hermannsweg in der Gemeinde Salzhausen.
- In der Samtgemeinde Hanstedt der Bau eines Park- und Radweges in Nähe von Hanstedt bis Döhle.
- Die Einrichtung von Radwanderwegen in der Gemeinde Asendorf von Maschen bis zur Landesgrenze Hamburg, der eine Verbindung von Hamburger Radwanderwegen schafft.
- Der Ausbau von Kommunikationsstätten für den Fremdenverkehr.

Von den fünf Hamburger Randgemeinden erhält der Landkreis Harburg damit den „Lehrern Brocken". Gefördert werden außerdem Lüneburg, Ratzeburg, Soltau-Fallingbostel und Stade.

Gegen Pipeline nach Hamburg

Hannover. Gegen den Bau einer Öl-Pipeline zwischen Wilhelmshaven und Hamburg sprach sich in Hannover der Landesverband Bürgerinitiativen Umweltschutz Niedersachsen (BIU) aus. Im Bereich der Ems bei Wilhelmshaven sei es in den vergangenen 15 Jahren „zu über 30 Ölunfällen durch Öltanker" gekommen.

Der Bau der Pipeline erhöhe die Gefahr eines großen Ölunfalls, da in ihr bereits Öl über Wilhelmshaven angelandet werde. Ein Unfall an der Ems würde sich auch [illegible]

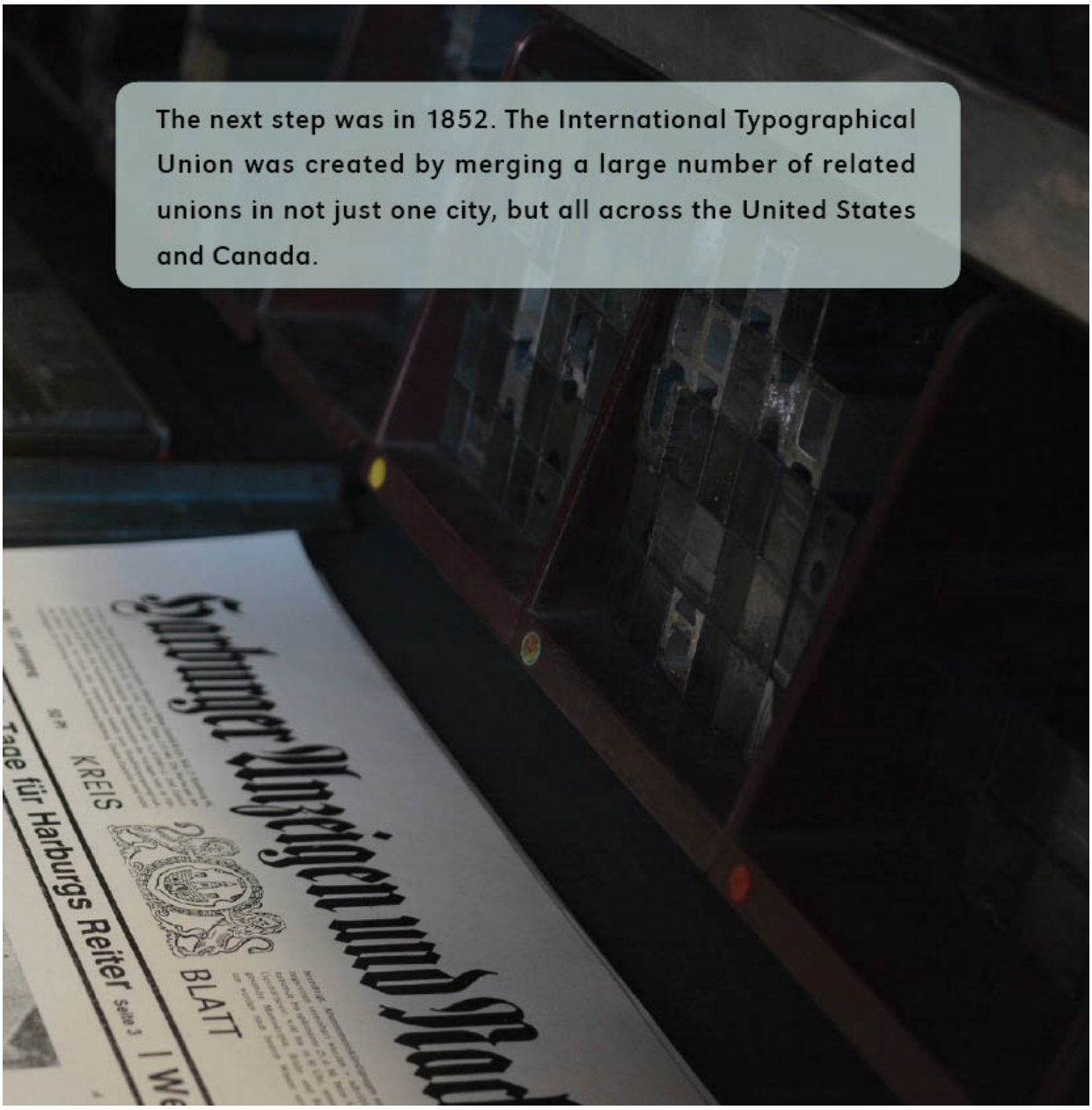
Zweikampf wieder heiß entflammt

Der Zweikampf zwischen Meister Bayern München und Vizemeister HSV ist nach dem vierten Spieltag der Fußball-Bundesliga wieder hoffähig. Beide standen nacheinander, wobei die HSV-Mannschaft [illegible] 3:0 beim 1. FC Nürnberg [illegible] gewinnen können. Unser Bild zeigt den Nürnberger Spieler Libuda und Jakobs im Duell. HSV-Libero Klaus-Dieter Nemitz zu. – Ausführlicher Bericht auf Seite 17. dpa

Neumann: SPD an Dialog interessiert

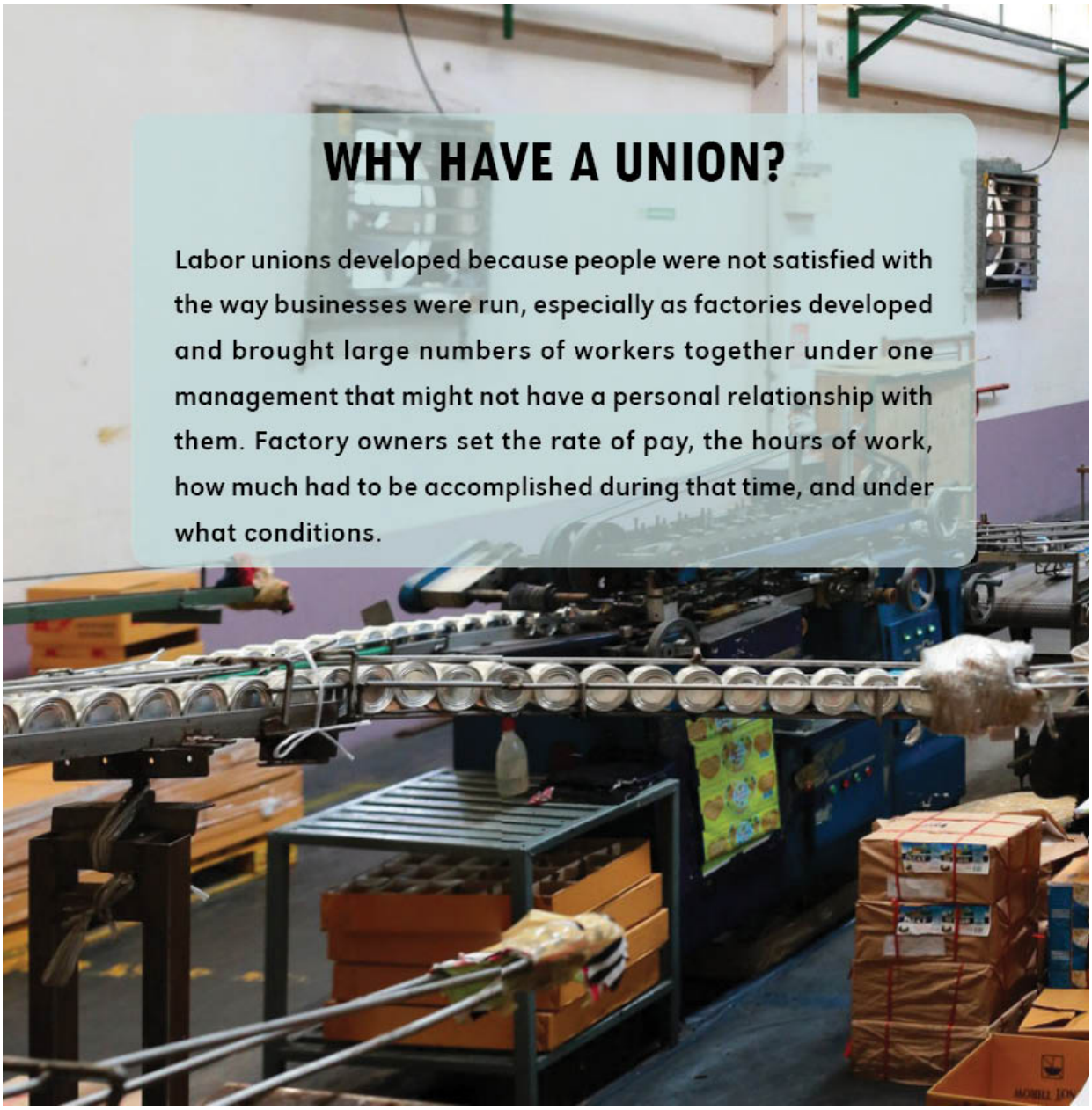
Weniger W

Tonnen



The next step was in 1852. The International Typographical Union was created by merging a large number of related unions in not just one city, but all across the United States and Canada.

These early American unions focused on craftsmen like shoemakers and stone masons more than on laborers in factories. There was little effort to organize, or help the conditions of, the least-skilled workers.



WHY HAVE A UNION?

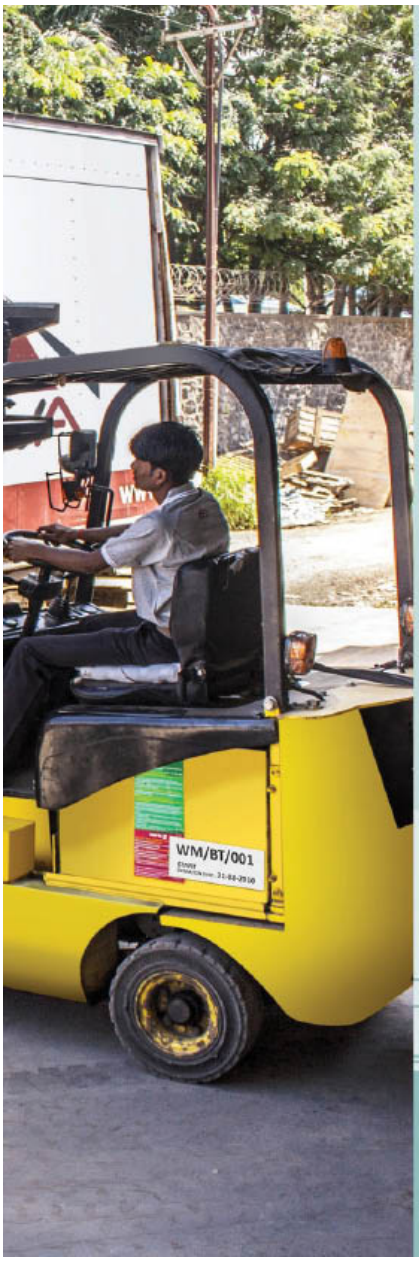
Labor unions developed because people were not satisfied with the way businesses were run, especially as factories developed and brought large numbers of workers together under one management that might not have a personal relationship with them. Factory owners set the rate of pay, the hours of work, how much had to be accomplished during that time, and under what conditions.

Often there was little consideration to safety of workers with new, powerful, and often deadly machines. Child labor was common, since boys and girls between eight and fourteen years old could do many tasks and be paid very little for their work.

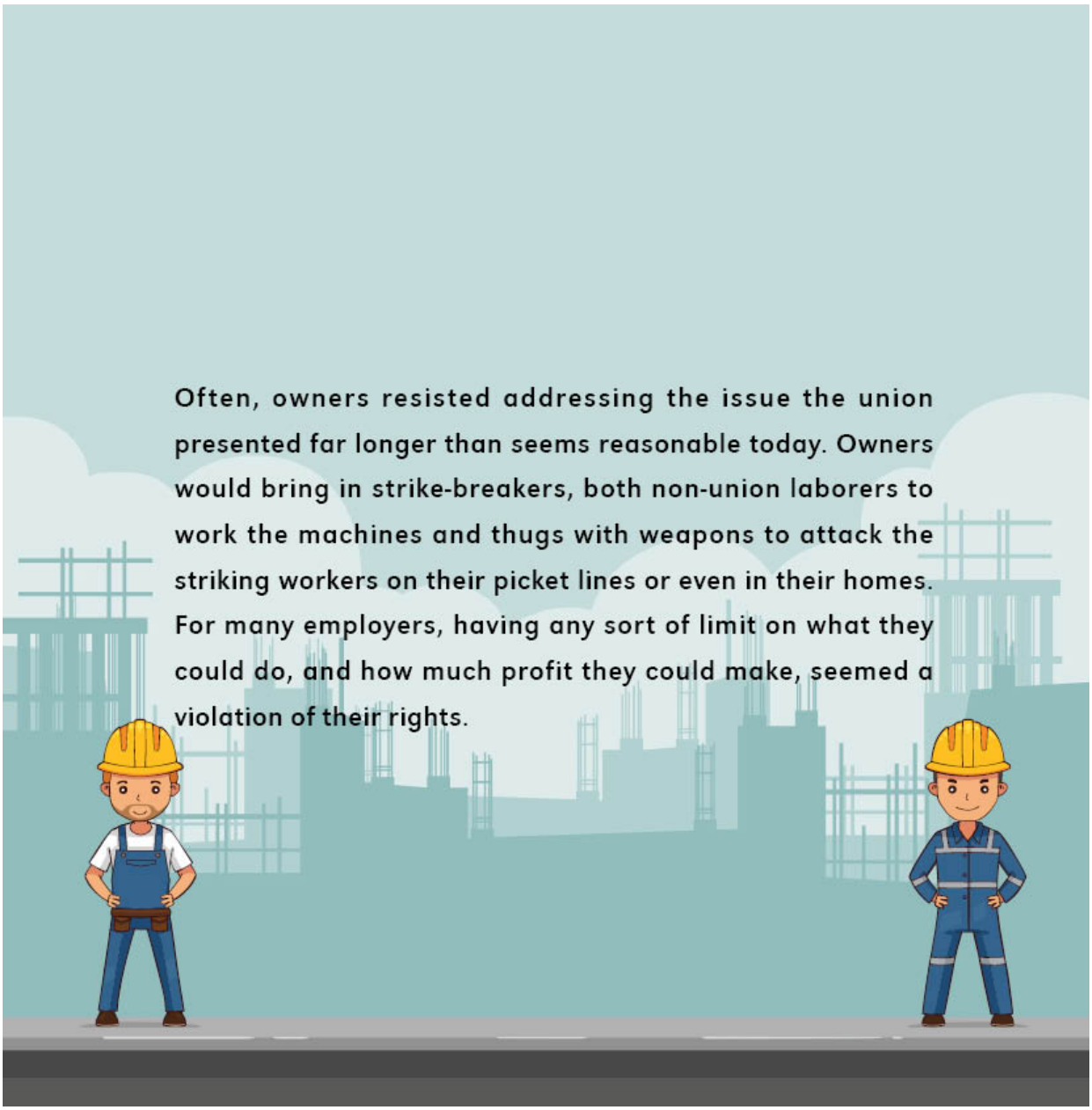

TT 016 E
TT 021 E

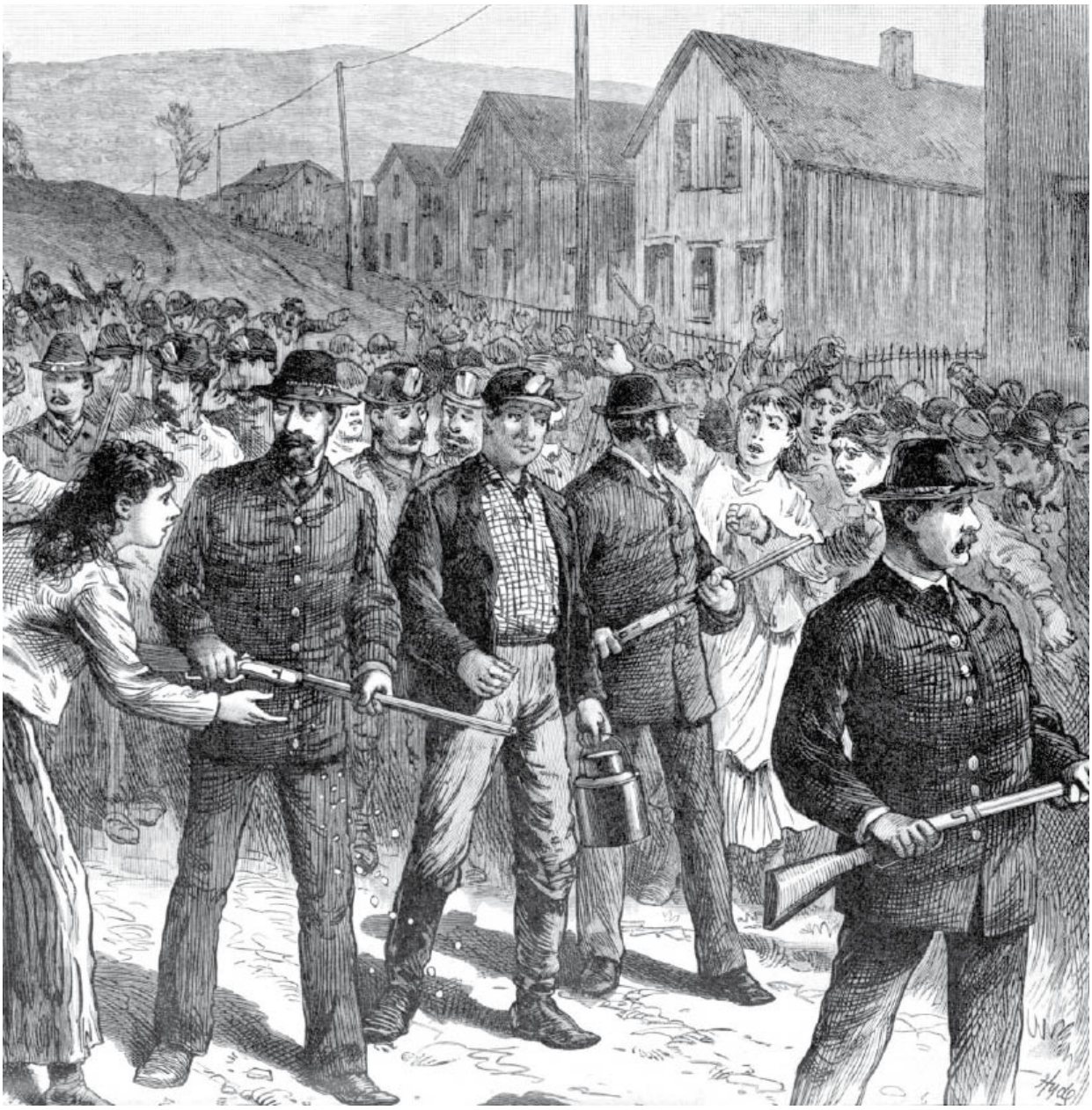
If a single worker complained about the working conditions, the rate of pay, or some other issue, that worker would probably be fired. Having a union meant that each worker did not have to stand up for themselves alone.


ADHASWAMI
JIT
TURBO INTERCOOLER
CEVA
TATA



When the union presented an issue, it also presented a consequence: if this thing is not resolved, we may stop working. You may not be able to produce your goods or make your money. Would it not be less expensive and less trouble to fix this thing than to try to resist making the change?


Often, owners resisted addressing the issue the union presented far longer than seems reasonable today. Owners would bring in strike-breakers, both non-union laborers to work the machines and thugs with weapons to attack the striking workers on their picket lines or even in their homes. For many employers, having any sort of limit on what they could do, and how much profit they could make, seemed a violation of their rights.

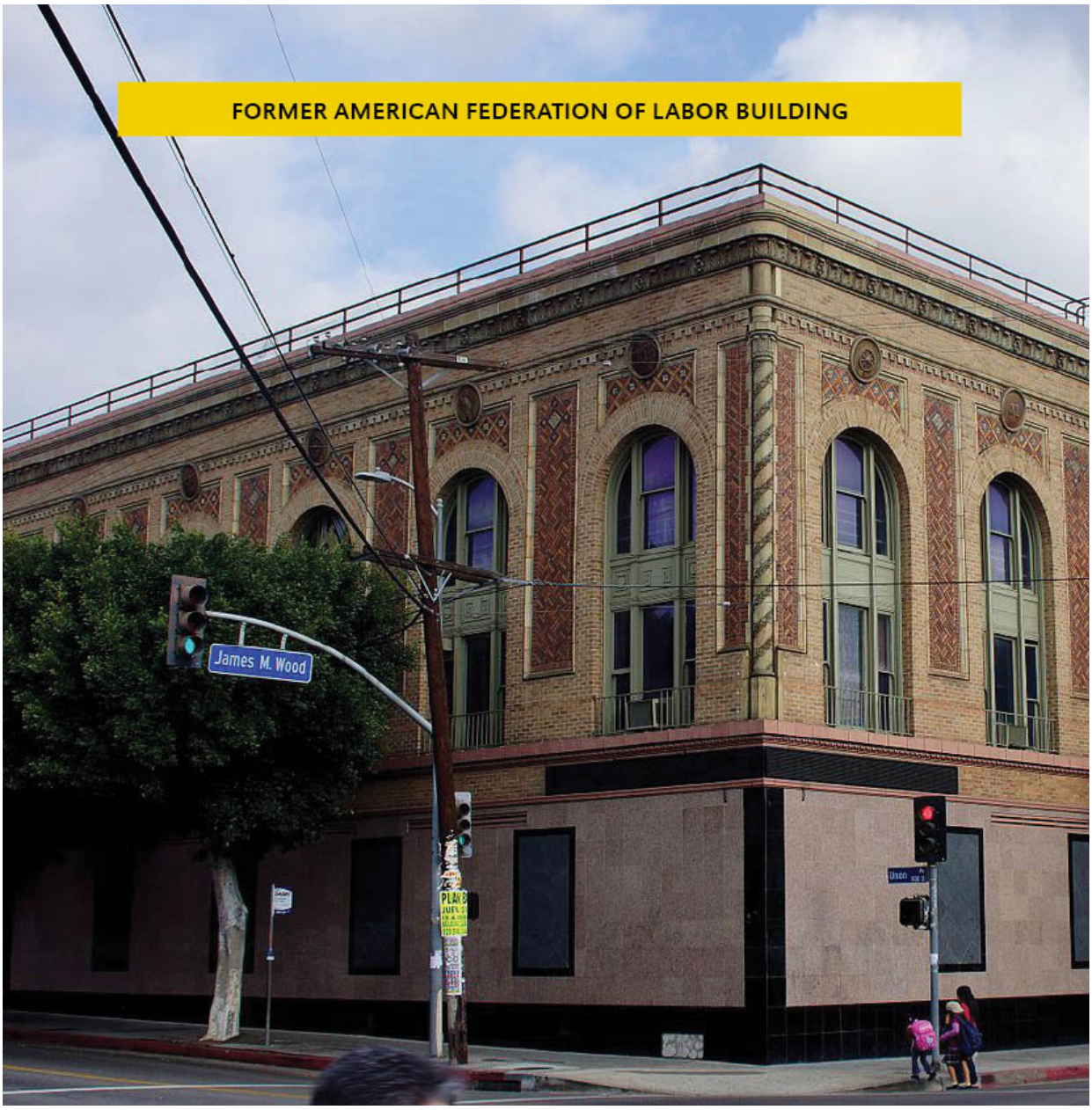


However, many other owners and employers came to see the sense of having a good working relationship with the union that their workers belonged to. Coming to an agreement that raised the hourly wage a little might cost the owners additional money, but it would also maintain production of the good or service that could be sold to make more money. A better-paid workforce also meant more people who could buy the factory's product!

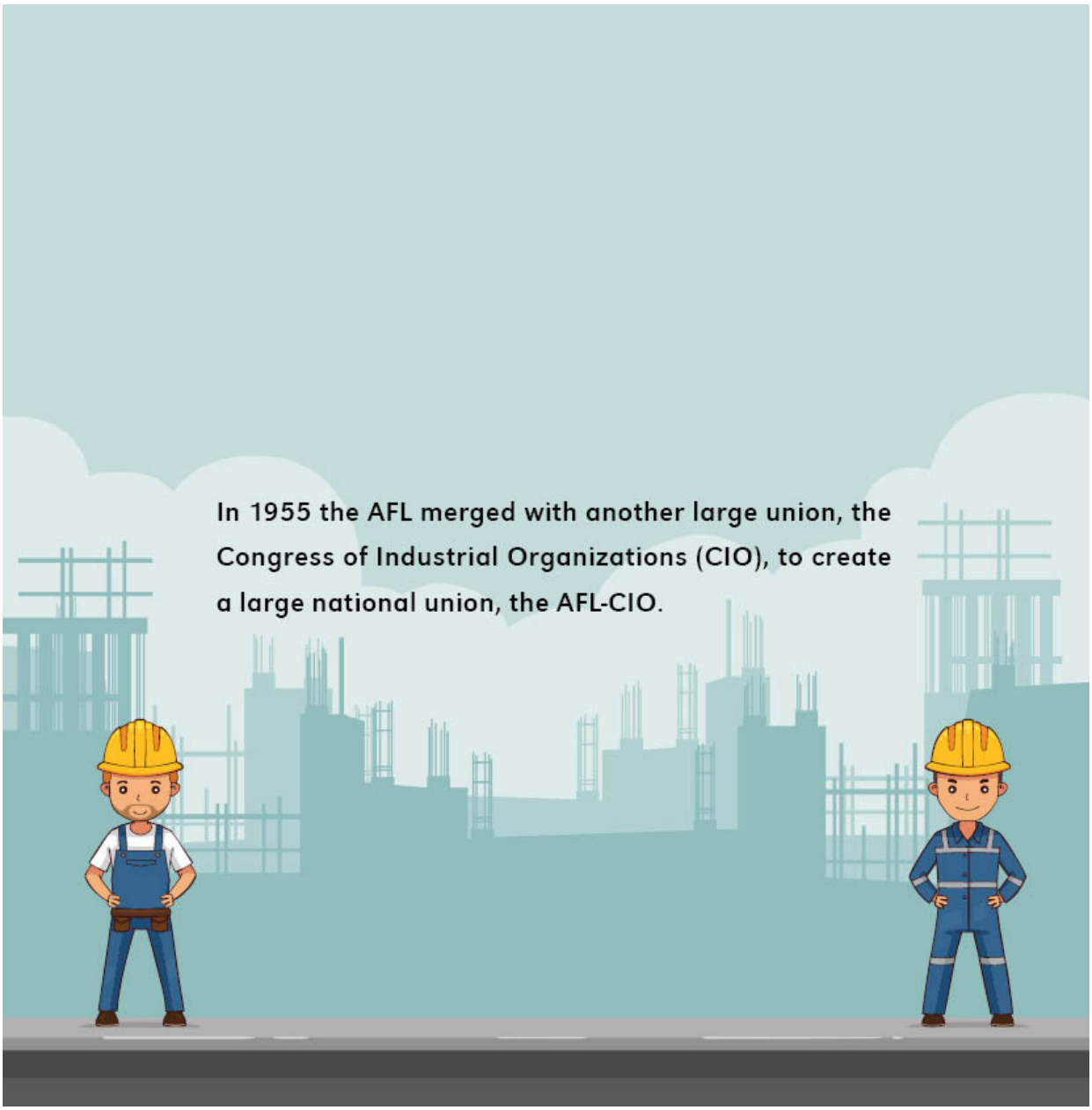
FIGHTING FOR THE RIGHTS OF WORKERS

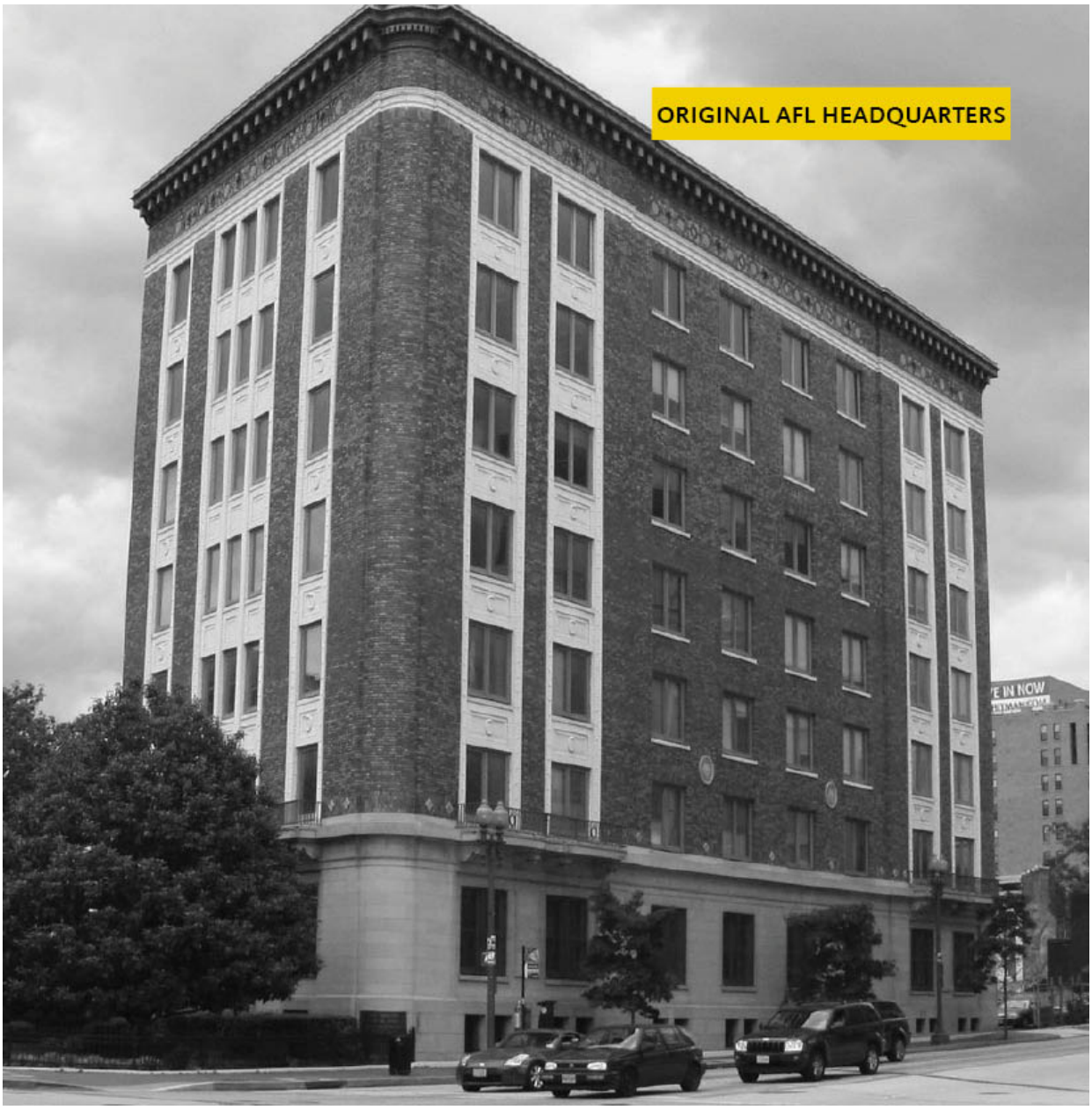
As North America became more and more industrialized, unions reached out more and more to factory workers, workers on trains, street sweepers, and other workers who did the everyday tasks of keeping the economy moving. Unions campaigned for ending child labor, providing health and retirement benefits to workers, making safer working conditions, and reducing the work week to forty hours.


au TREPORT
La Marée Tréportaise
Arrivages journaliers de poissons
Plateaux de Fruits de Mer
Tel : 02.35.86.81.19


FORMER AMERICAN FEDERATION OF LABOR BUILDING
James M. Wood

In 1886 the American Federation of Labor (AFL) was founded. It had almost 1.5 million members and campaigned successfully to improve wages and working conditions across the industries it represented.

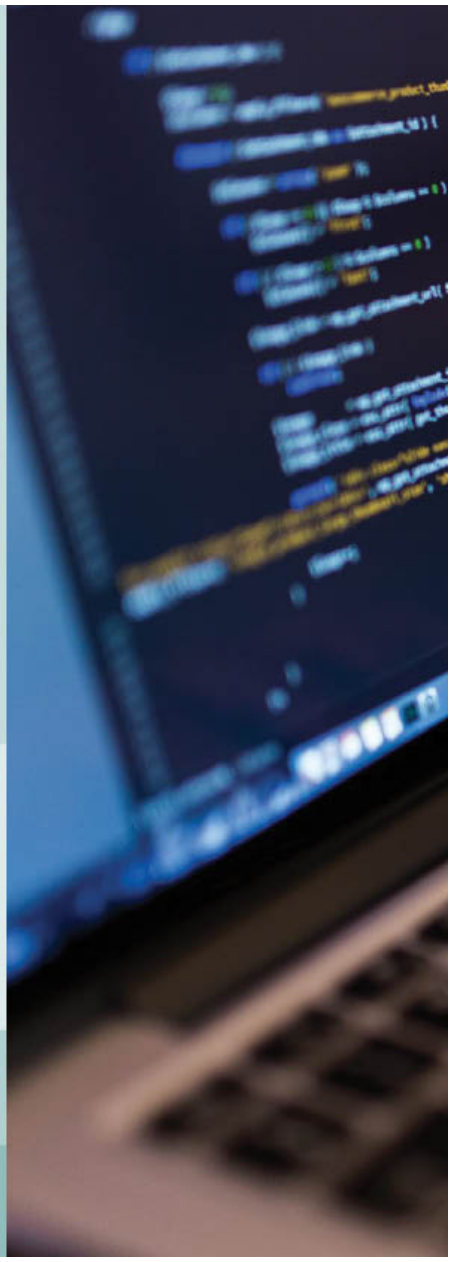

In 1955 the AFL merged with another large union, the Congress of Industrial Organizations (CIO), to create a large national union, the AFL-CIO.

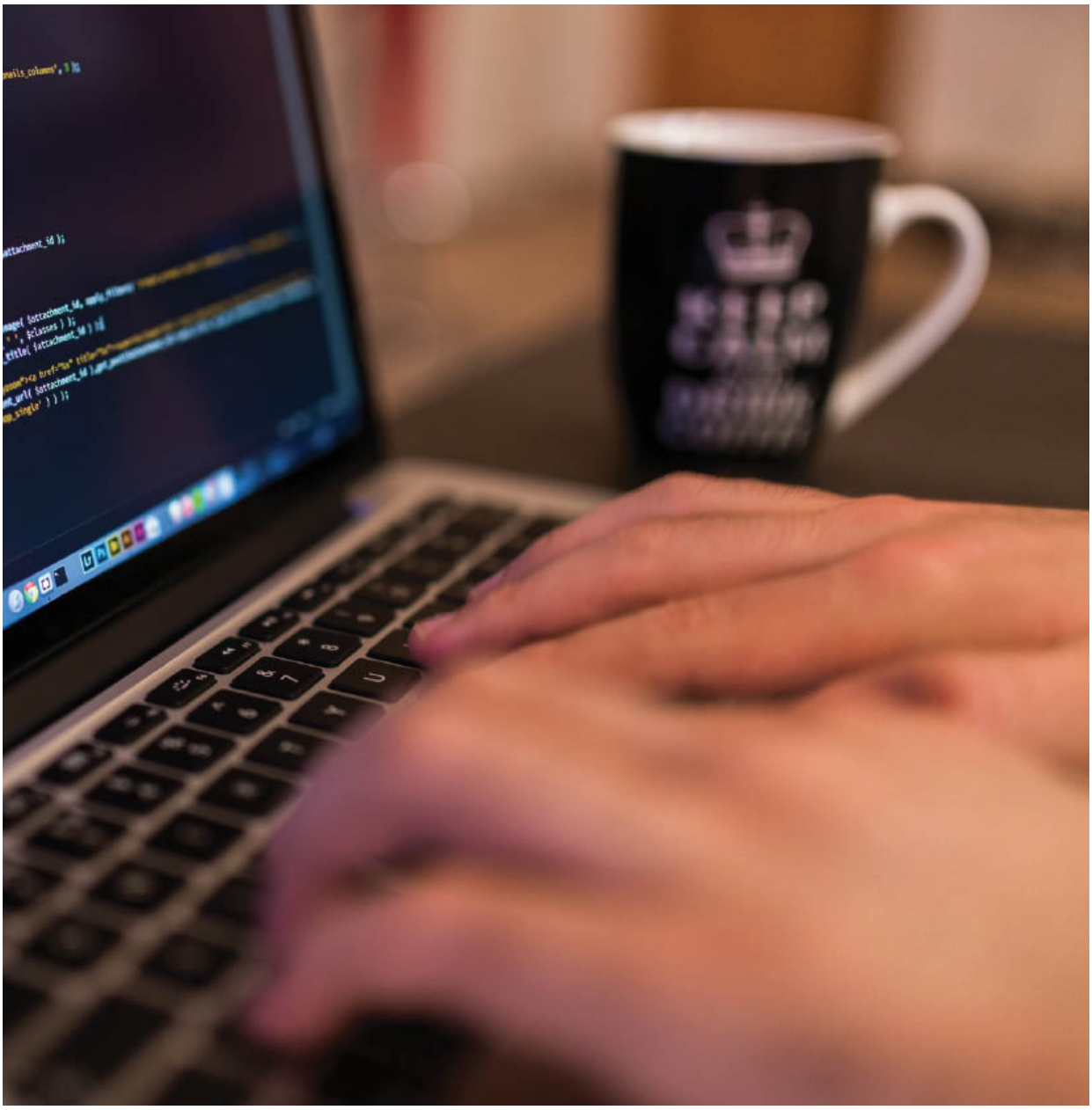

ORIGINAL AFL HEADQUARTERS

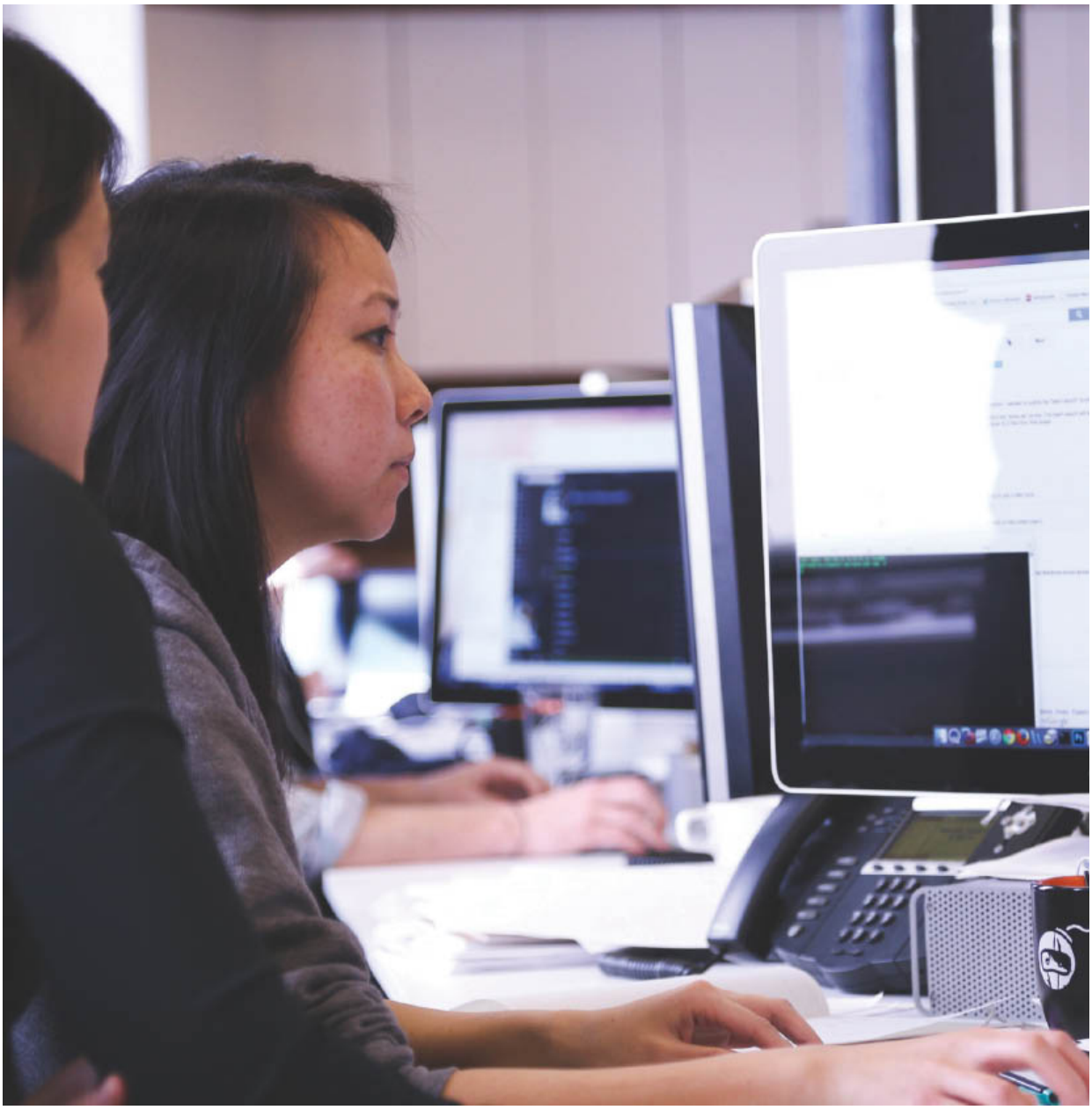
UNIONS TODAY

Union membership in the United States and Canada reached its peak around 1970. In the United States at that time, about one third of workers were represented by unions.

The North American economy began a move toward knowledge-based work, like computer programming, and service work, and away from manufacturing. As factories closed and their work went to factories in other countries where the cost of labor was cheaper, millions of unionized jobs disappeared. There was also a concerted effort by business groups and the wealthy to depict unions as corrupt and somehow un-American. This, combined with laws in many states that make it harder to organize a union, have cut into the union movement. Now about 11 percent of the North American labor force is unionized.

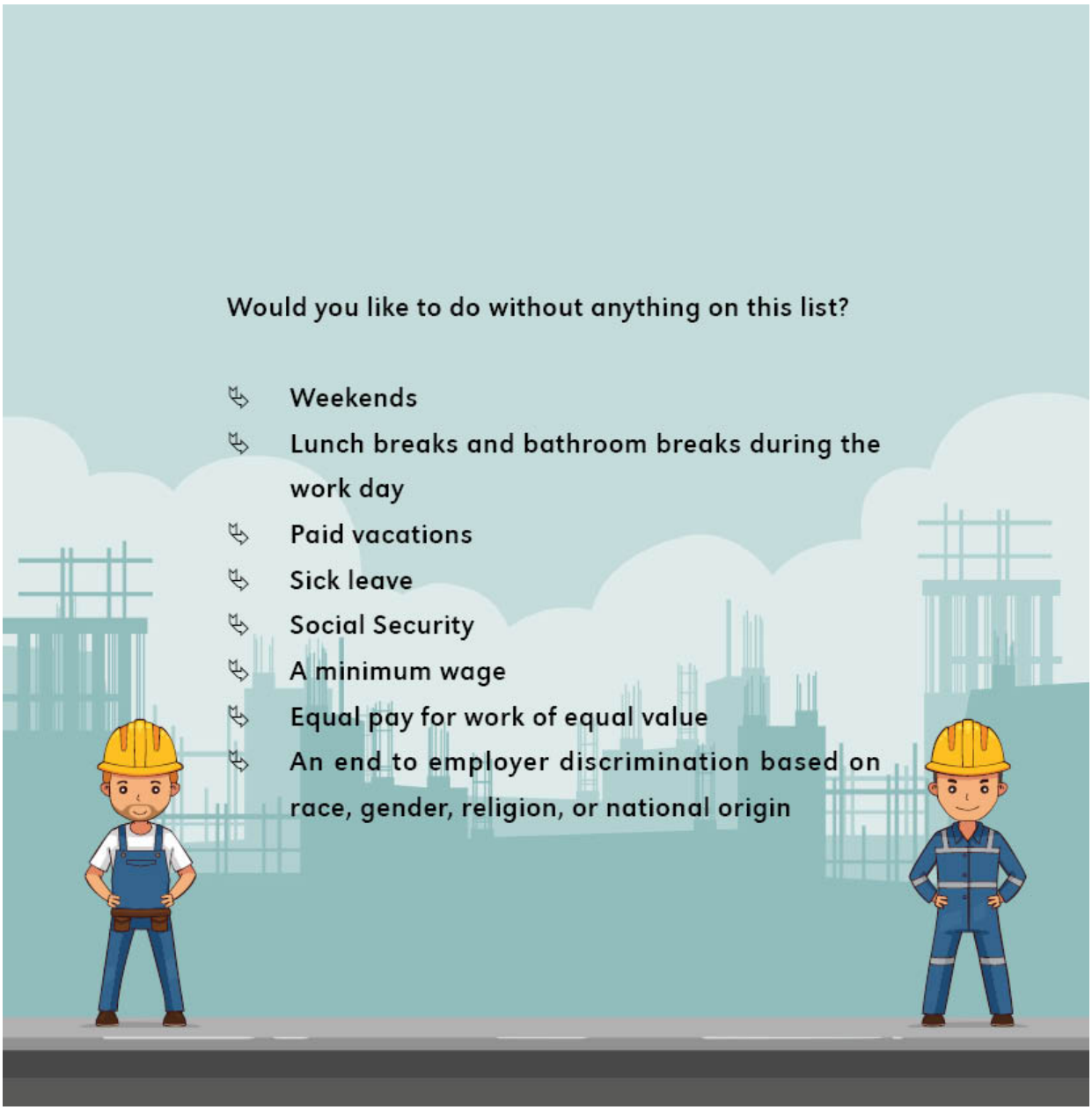


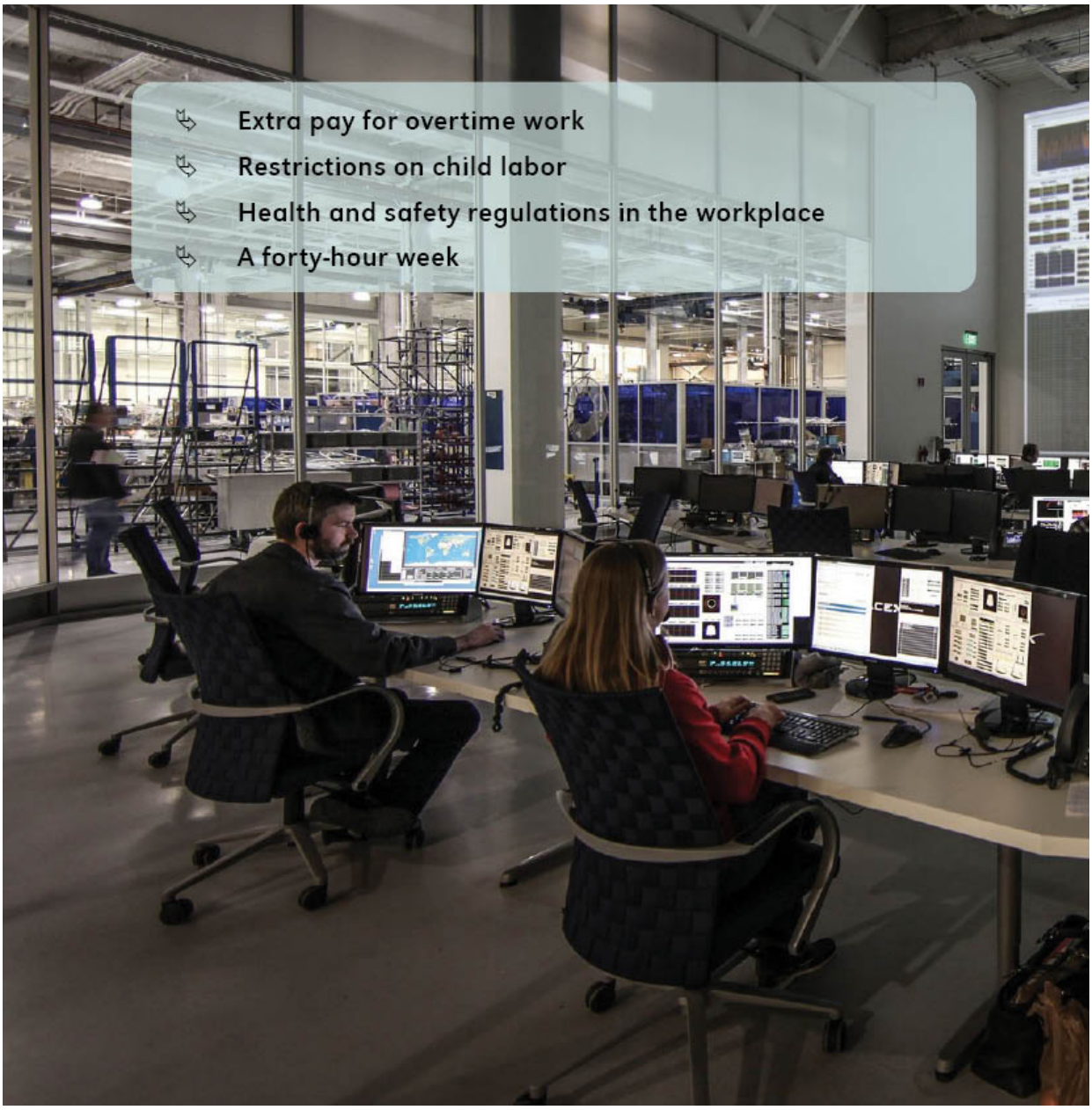




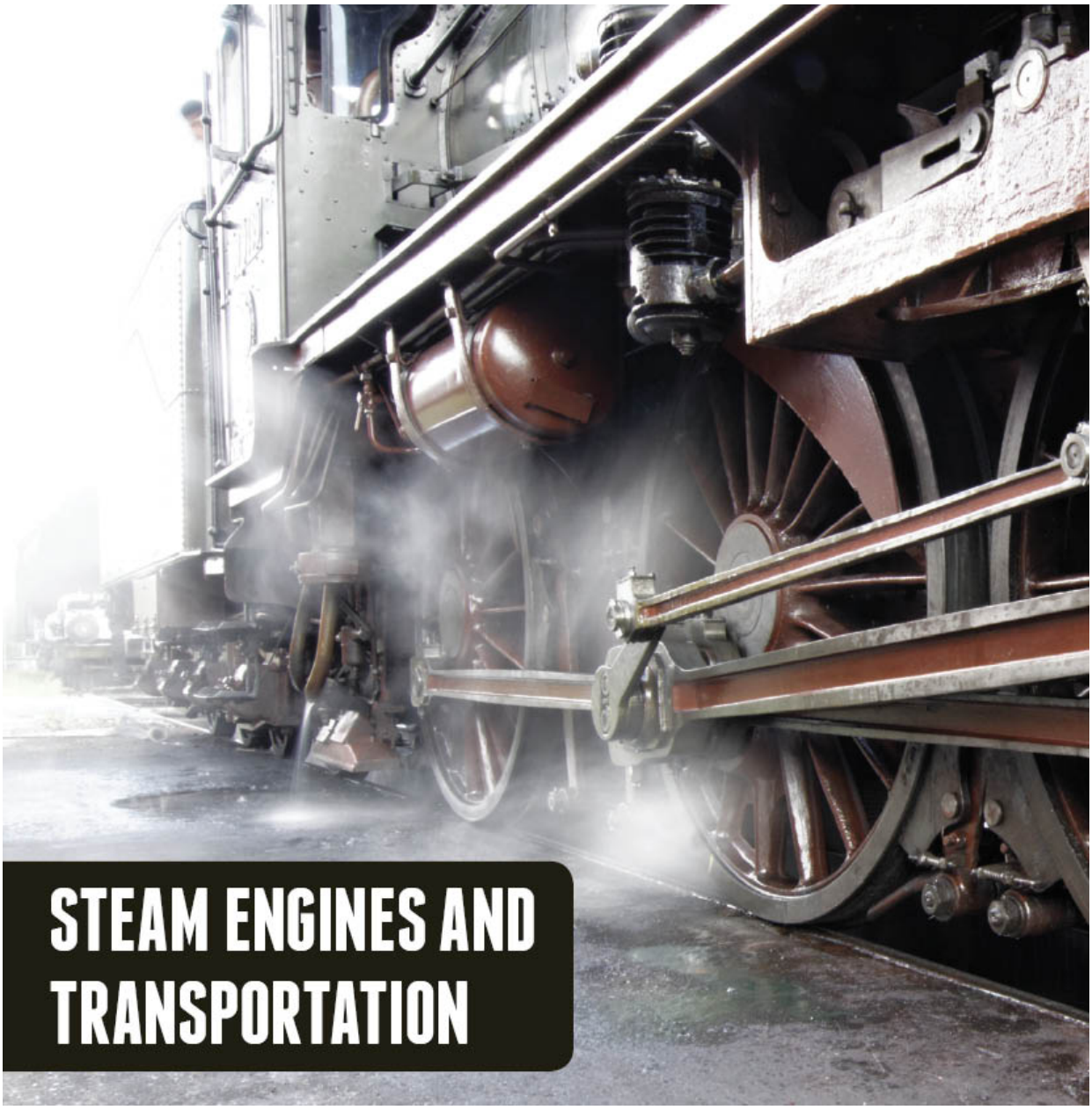
THANK A UNION FOR THIS

It is worth remembering many things that unions worked for that we now take for granted. When unions were campaigning for these causes, many of them were considered too expensive or too idealistic.

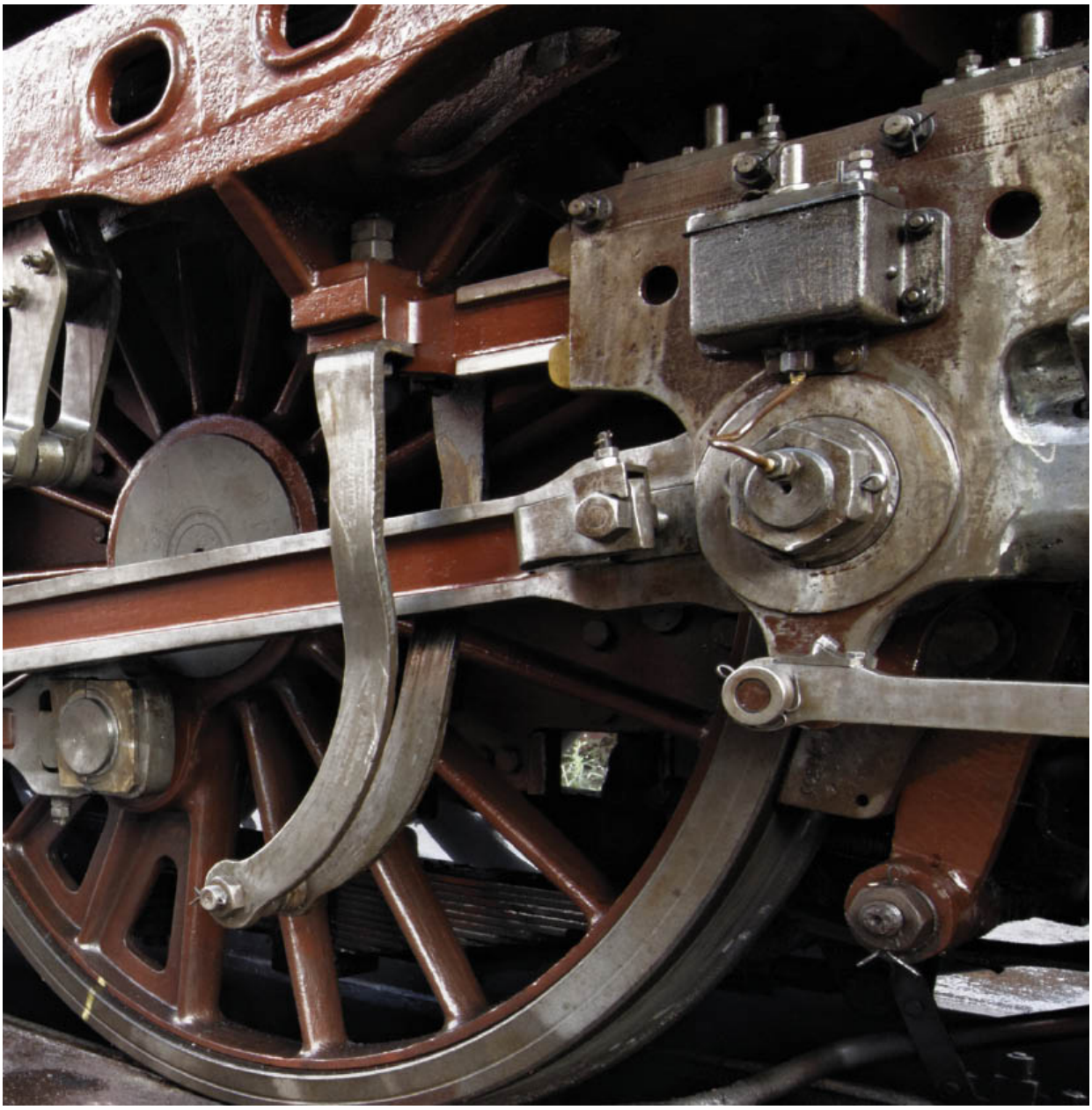

Would you like to do without anything on this list?
Weekends
Lunch breaks and bathroom breaks during the work day
Paid vacations
Sick leave
Social Security
A minimum wage
Equal pay for work of equal value
An end to employer discrimination based on race, gender, religion, or national origin


Extra pay for overtime work
Restrictions on child labor
Health and safety regulations in the workplace
A forty-hour week

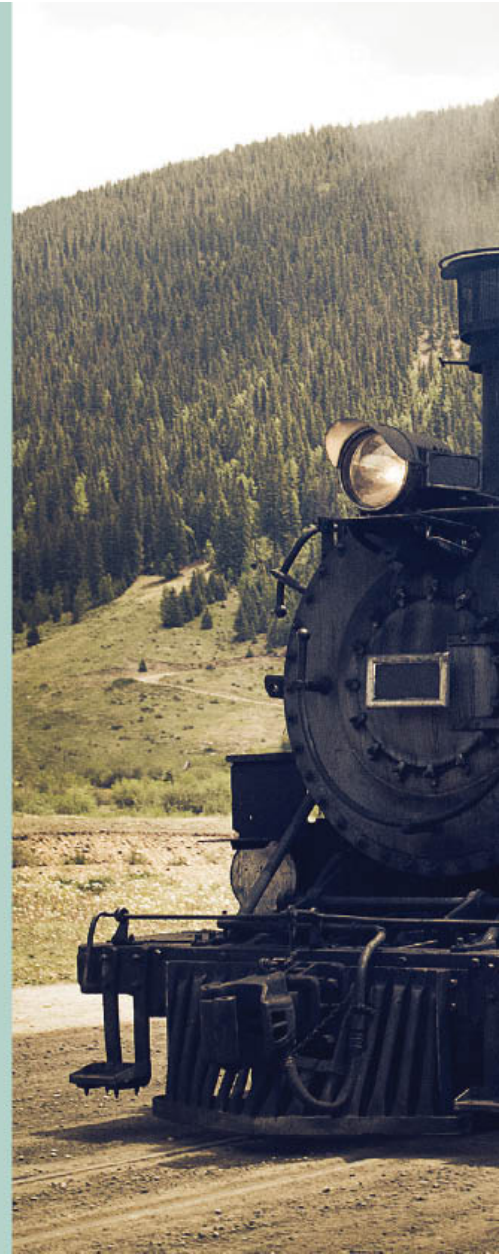

The right to bargain as a unit, rather than each worker having to bargain with the boss
Unemployment insurance
And many others!

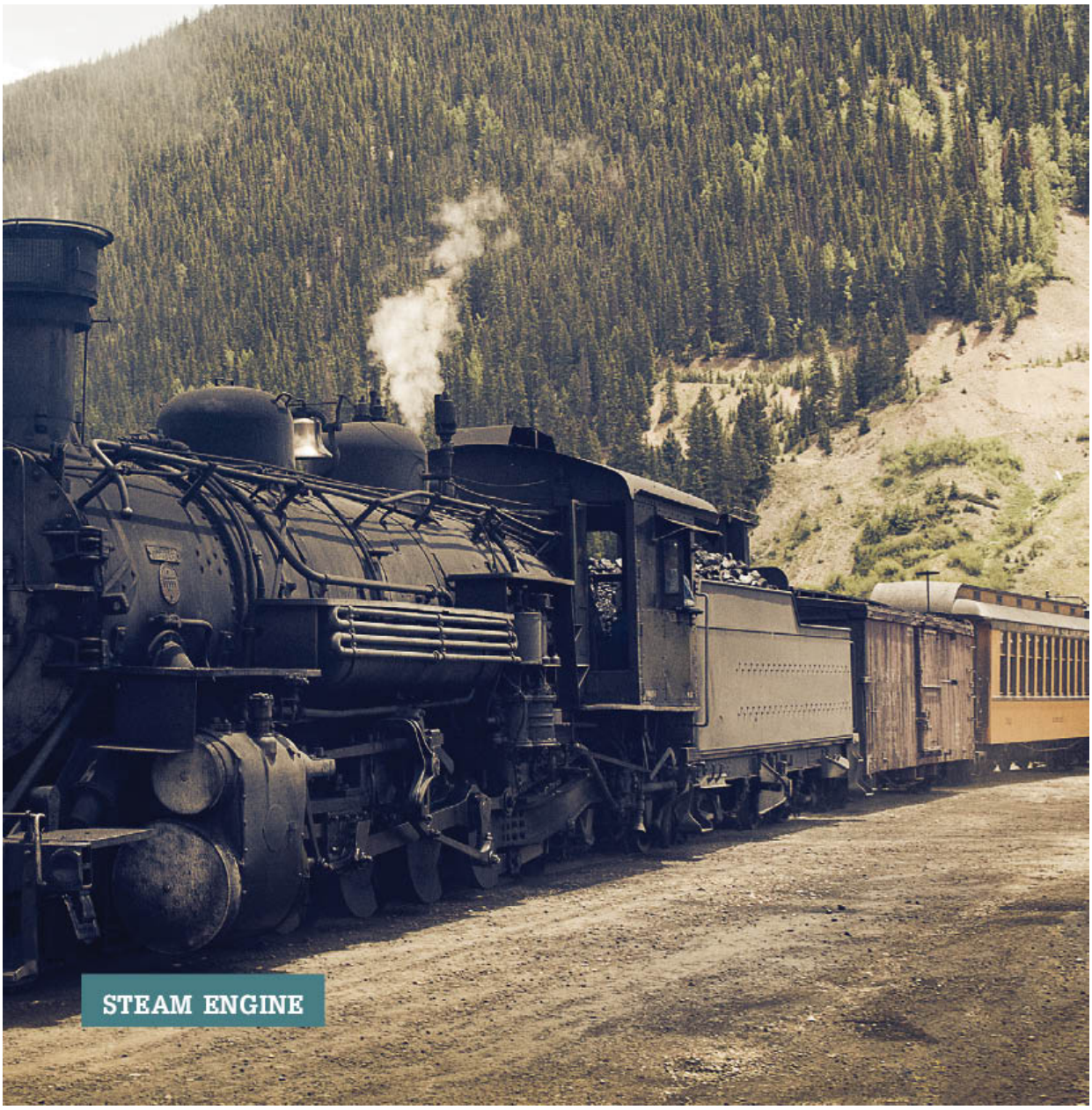


STEAM ENGINES AND TRANSPORTATION



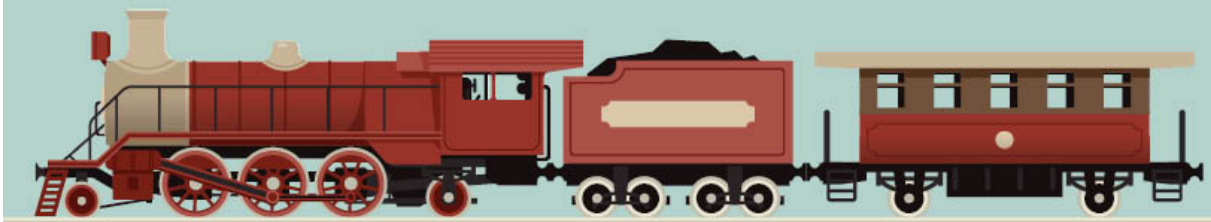
The steam engine was one of the most important new inventions that came out of the era of the Industrial Revolution. Although the Industrial Revolution had started before the perfection of the steam engine, without it, the technology and inventions of that era wouldn't have progressed as quickly as they did.



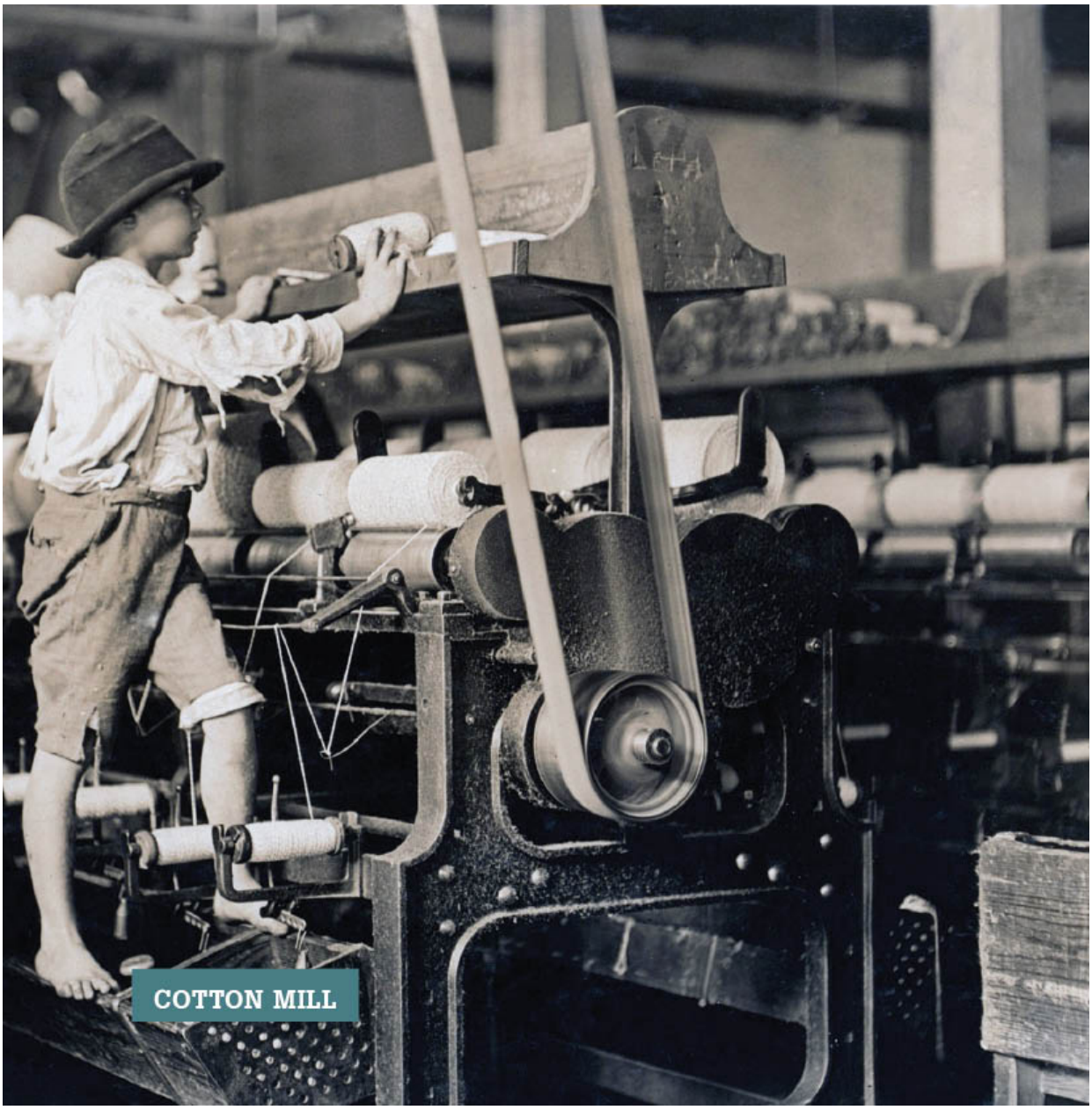

STEAM ENGINE

HOW DOES A STEAM ENGINE OPERATE?

An engine that runs on steam operates using steam created from boiling water. To make the steam, coal was burned to heat the water to the boiling point.



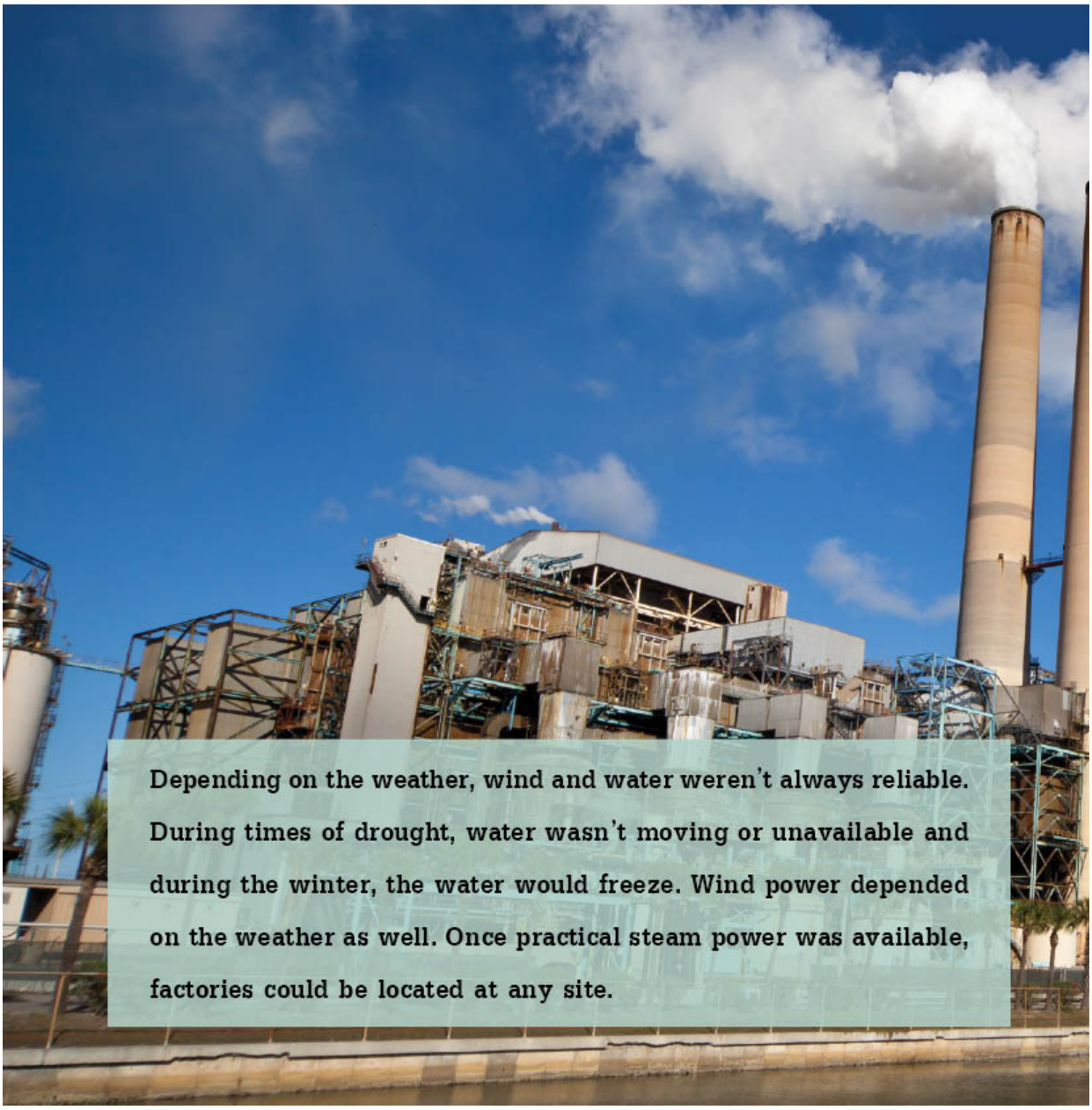
The hot steam created from the boiling water would move pistons within cylinders. The movement of the pistons in the cylinders provides power to a machine or is used to rotate a wheel.



COTTON MILL

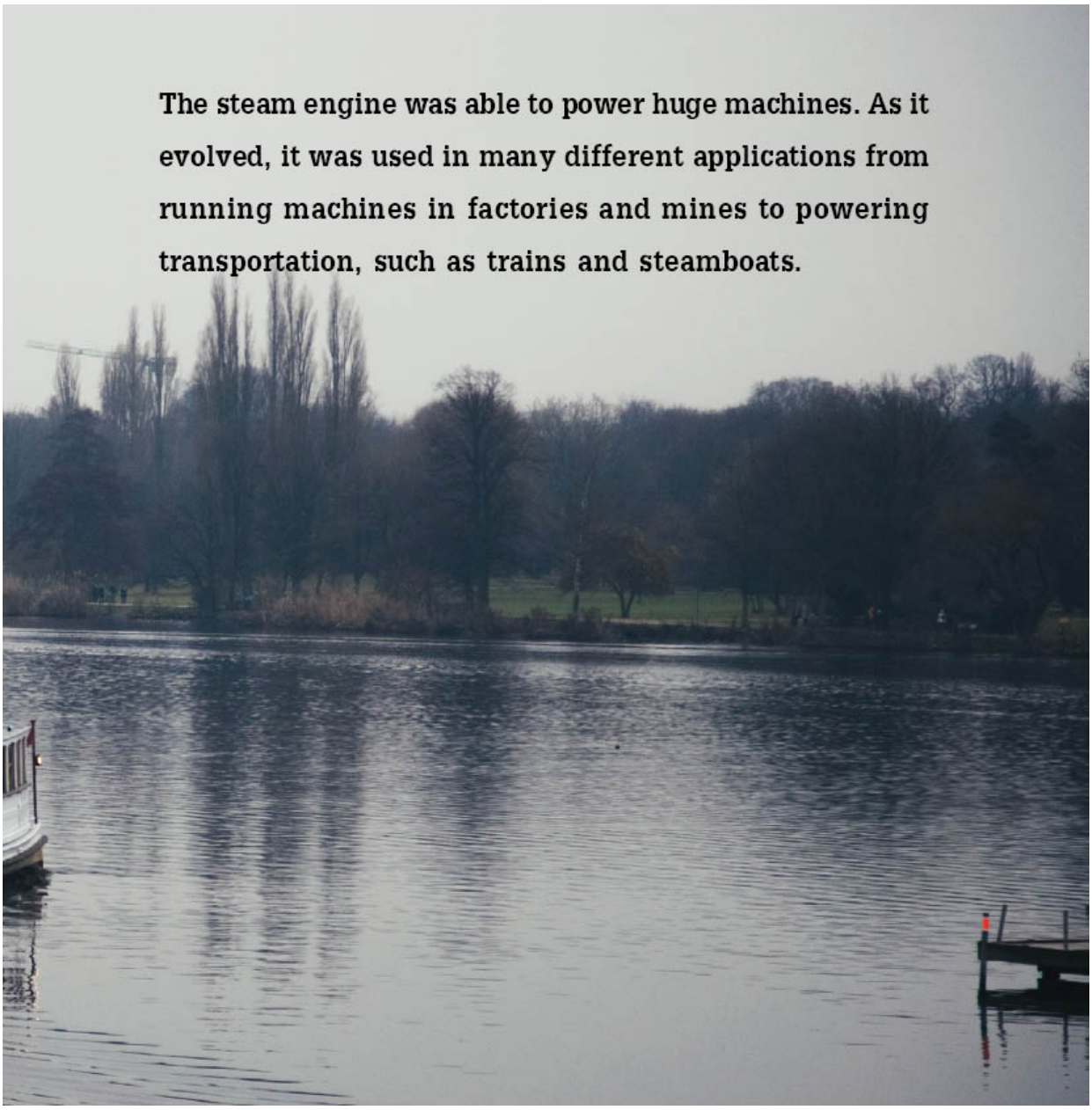
WHY WAS THE STEAM ENGINE IMPORTANT?

Prior to the advent of steam power, manufacturing facilities and textile mills needed to be powered by wind or water. Supplies had to be brought to the locations by men or beasts of burden. Although water was a good use of power, the factories were limited in terms of the locations where they could be built since a fast-moving river had to be nearby.



Depending on the weather, wind and water weren't always reliable. During times of drought, water wasn't moving or unavailable and during the winter, the water would freeze. Wind power depended on the weather as well. Once practical steam power was available, factories could be located at any site.

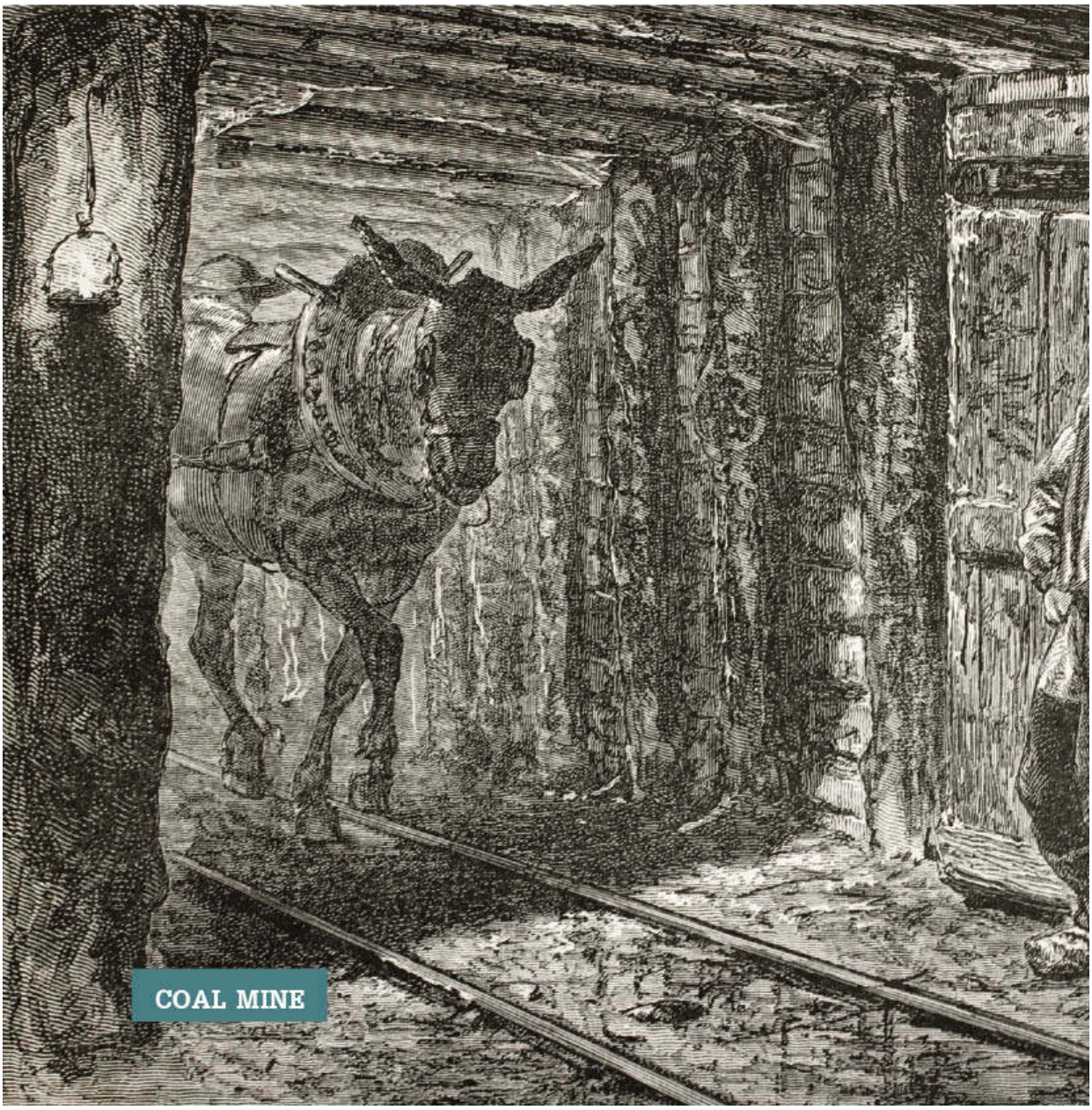

STEAMBOAT



The steam engine was able to power huge machines. As it evolved, it was used in many different applications from running machines in factories and mines to powering transportation, such as trains and steamboats.

THE HISTORY OF THE STEAM ENGINE

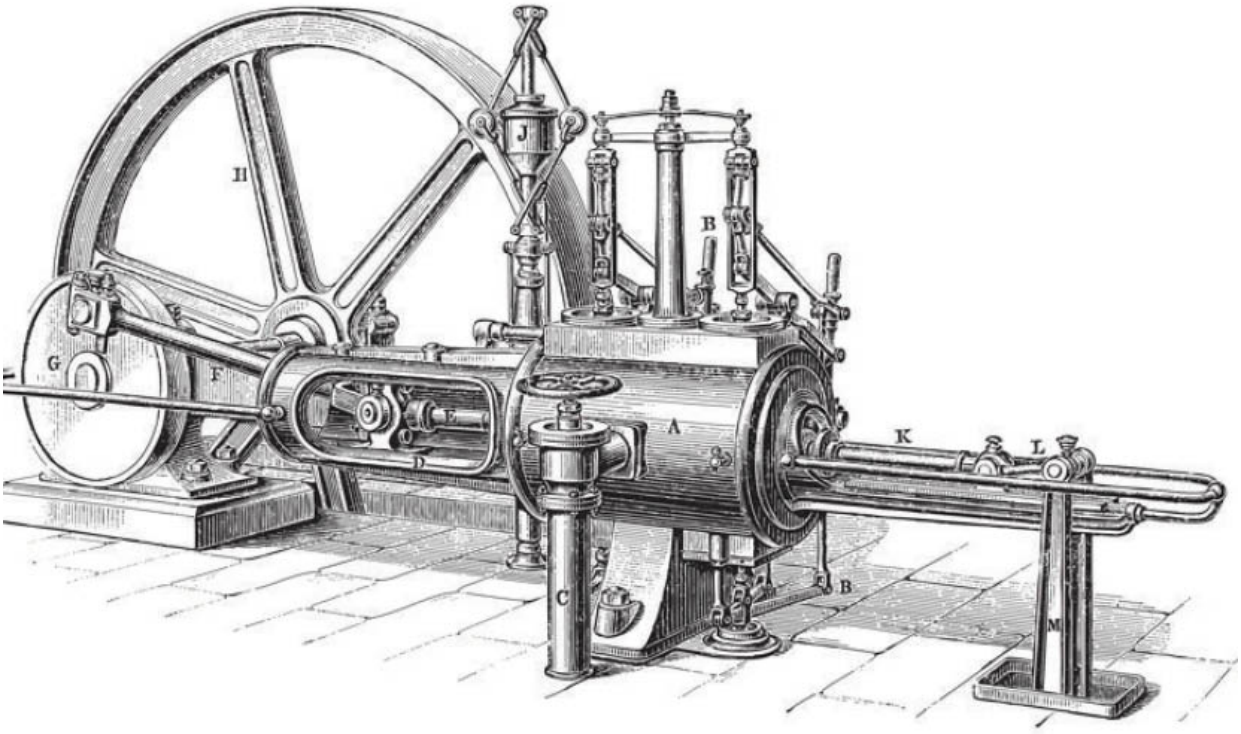
The ancient Greeks knew about the power of steam but it was sixteen hundred years after that discovery when steam was first used to power engines. Prior to that time, beasts of burden had to be used to transport supplies.



COAL MINE

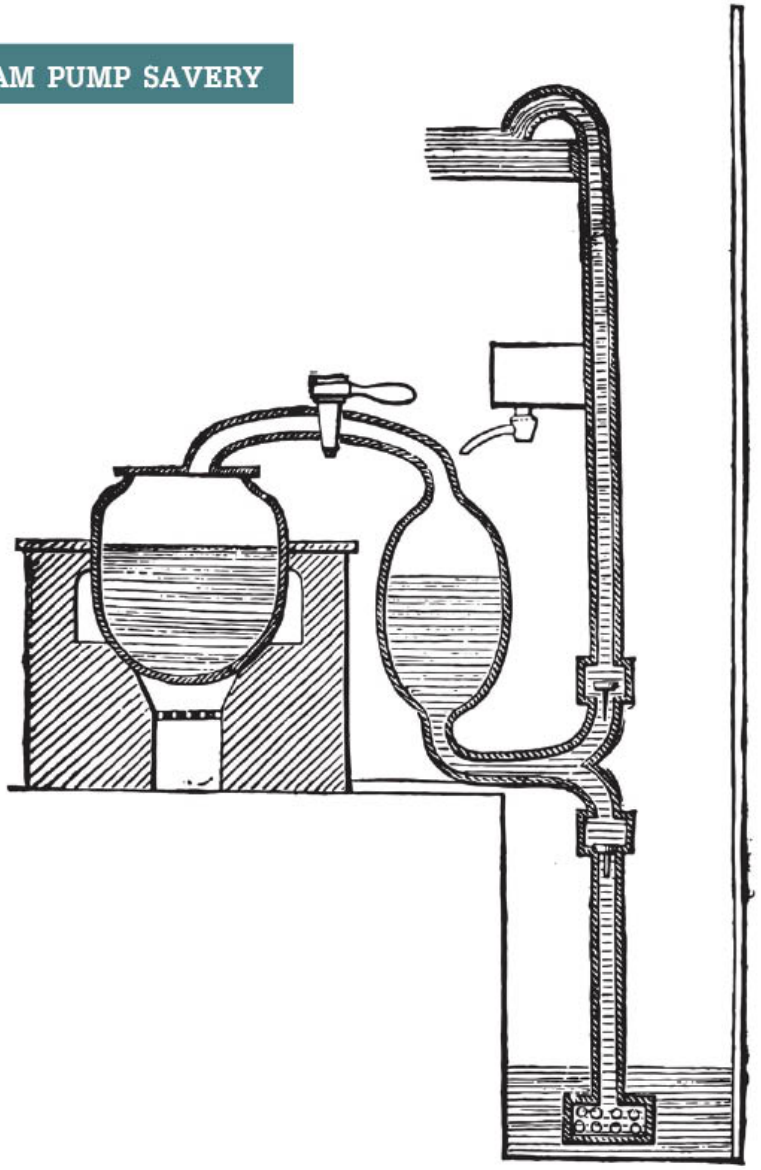
In the 17th century, glassmakers in Britain needed vast amounts of fuel in the form of coal to keep their furnaces stoked to produce glass. The system that was being used was one that was dependent on slow-moving horses and pulleys to drain the water out of the coal mines so the coal could be extracted. They needed a better way to do this faster and they offered money to any scientist who could figure it out.

In the year 1698, Thomas Savery, an inventor from Britain, invented a pump that was powered by steam. The steam in the pump created a vacuum and was able to pull the water up vertically through a pipe. The theory behind this invention had been around for many centuries, but had never been made practical.



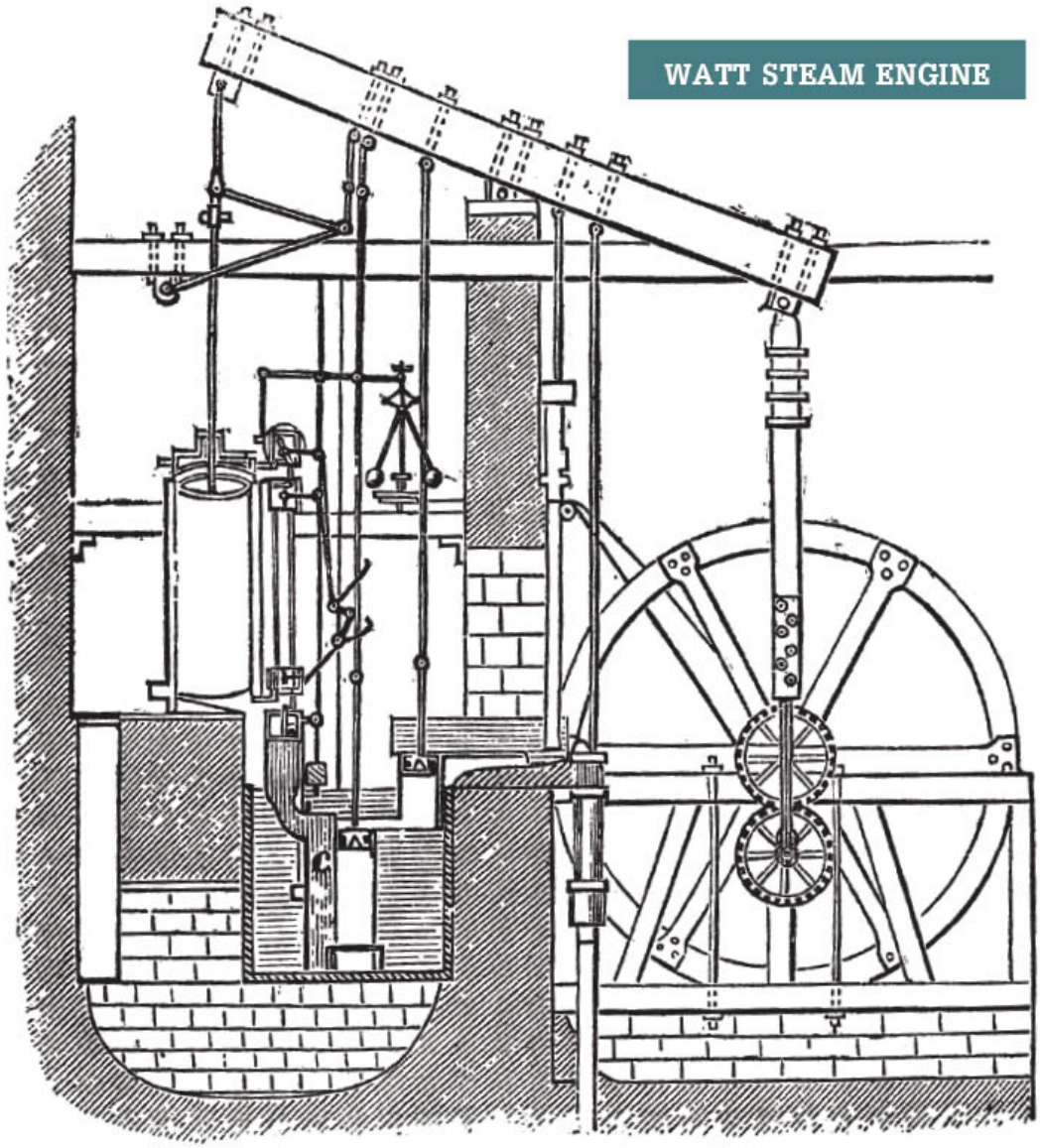
OLD STEAM MACHINE

STEAM PUMP SAVERY



A blacksmith by trade, Thomas Newcomen, improved on Savery's pump in 1712 through the use of pistons as well as cylinders. Newcomen's engine was quickly used to pump water out of mines.

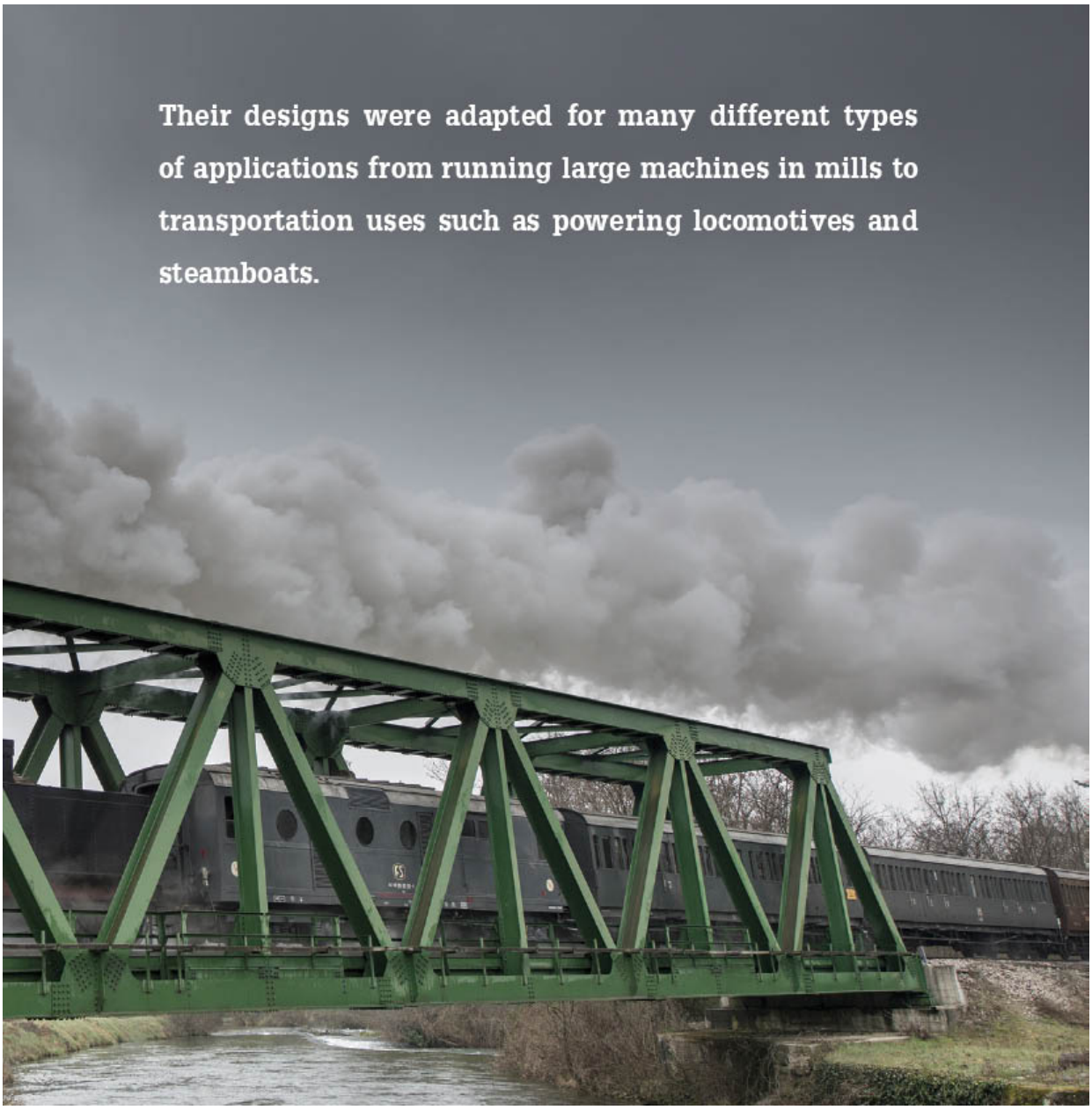
Then, in 1778, James Watt improved the design of the steam engine dramatically with the help of his business partner Matthew Boulton. The men installed hundreds of new steam engines in factories. The Boulton and Watt steam engine was more compact and didn't need as much coal to power it. Soon, everyone knew about this speedy engine and by the early part of the 1800s, it was operating in factories in Great Britain. Watt coined the term "horsepower" so he could explain to potential customers how much power his engine could produce compared to the power of horses. It was a brilliant marketing decision because it helped people to understand the power of his engines very quickly.



WATT STEAM ENGINE


Throughout the next hundred years, different inventors
worked to improve steam engines.

Their designs were adapted for many different types of applications from running large machines in mills to transportation uses such as powering locomotives and steamboats.



CHANGES IN TRANSPORTATION

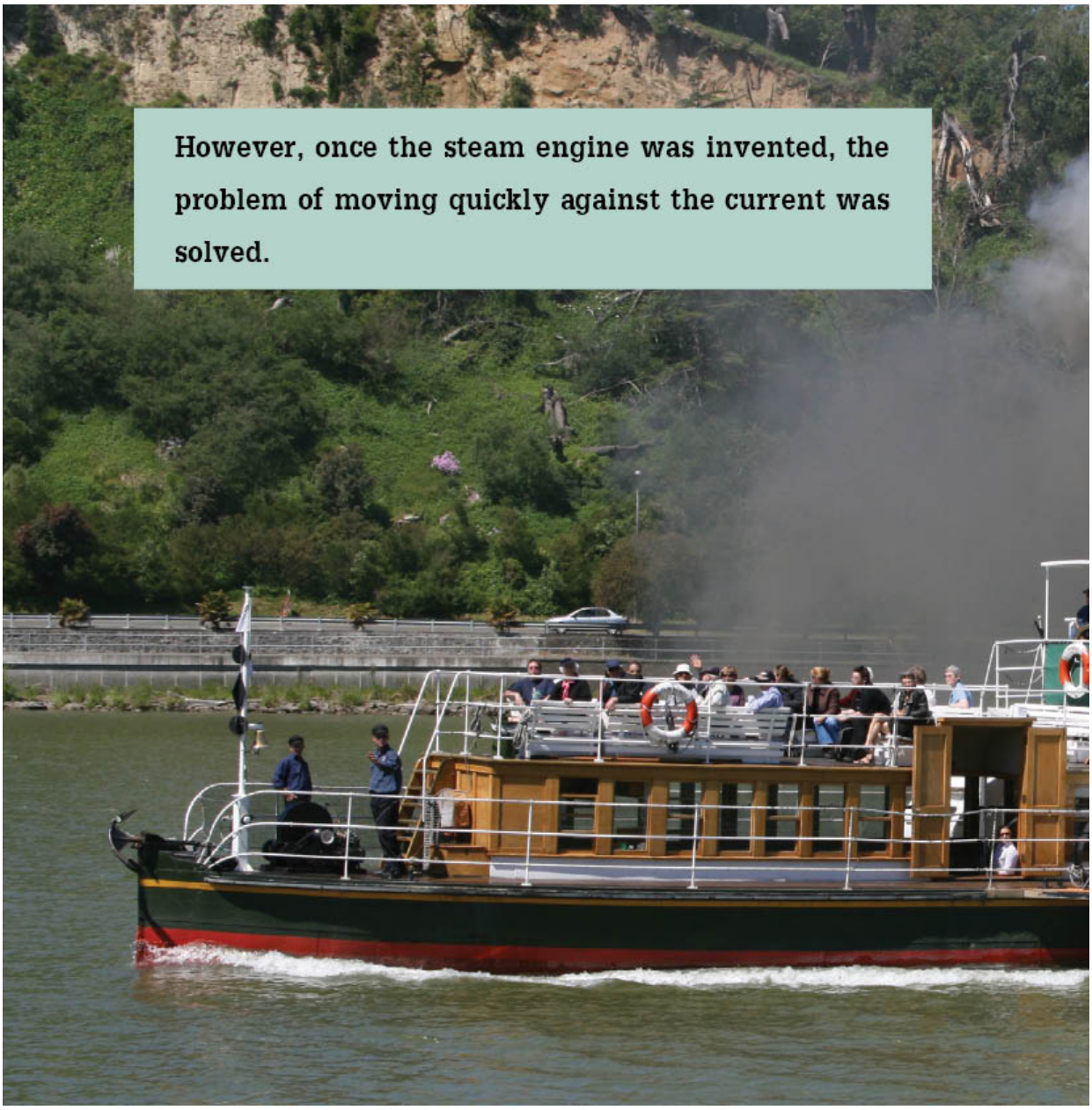
The Industrial Revolution completely transformed how people and goods were moved from one place to another. Before the steam engine, men had to rely on beasts of burden to pull carts or wagons. Boats were used on waterways but they weren't very fast. Travel of all types was very slow and arduous. To travel from the east coast to the west coast of the United States took months. Once the steam engine was adapted for powering transportation this all changed. The first of these changes was the way boats were powered.


433001

STEAM RIVERBOAT

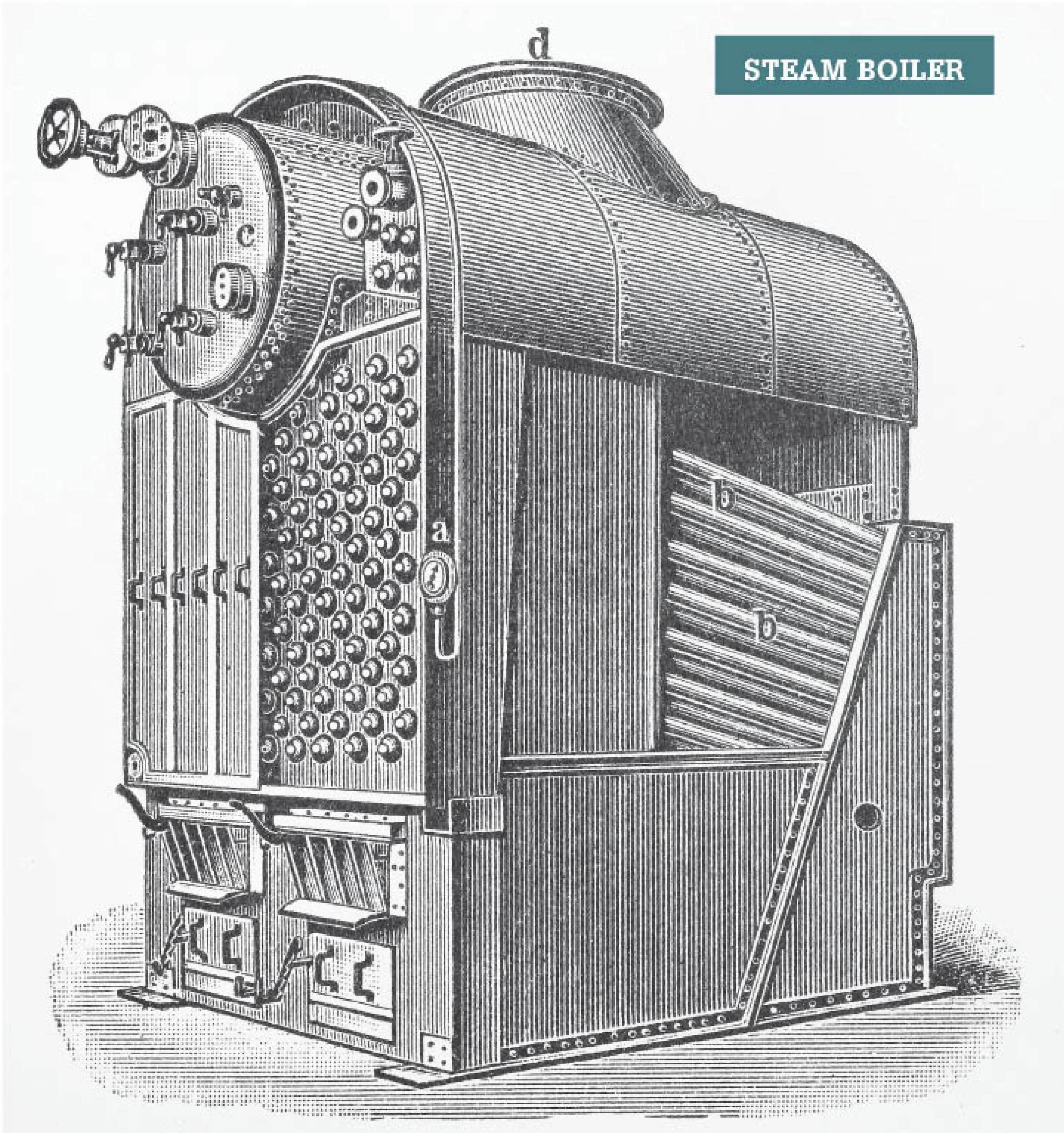
STEAMBOATS ON THE RIVER

Boats to transport goods by waterways had been used since ancient times. They were great for traveling downstream with the current, but when they had to go upstream it was a challenge. Men could use oars to travel against the current and wind power could sometimes be harnessed to speed up boats on their travels.


However, once the steam engine was invented, the problem of moving quickly against the current was solved.

Robert Fulton, an American inventor, who had built submarines before, created the first practical steamboat that could be used for commercial purposes in 1807. This boat could travel against the current upstream through the power of its steam engine.

It didn't take long for steamboats to be carrying people and supplies along the waterways of the United States. At the beginning, the boilers on steamboats were dangerous and sometimes exploded. In fact, the brother of famous author Mark Twain, Henry Clemens, was killed by a steamboat boiler explosion.


STEAM BOILER
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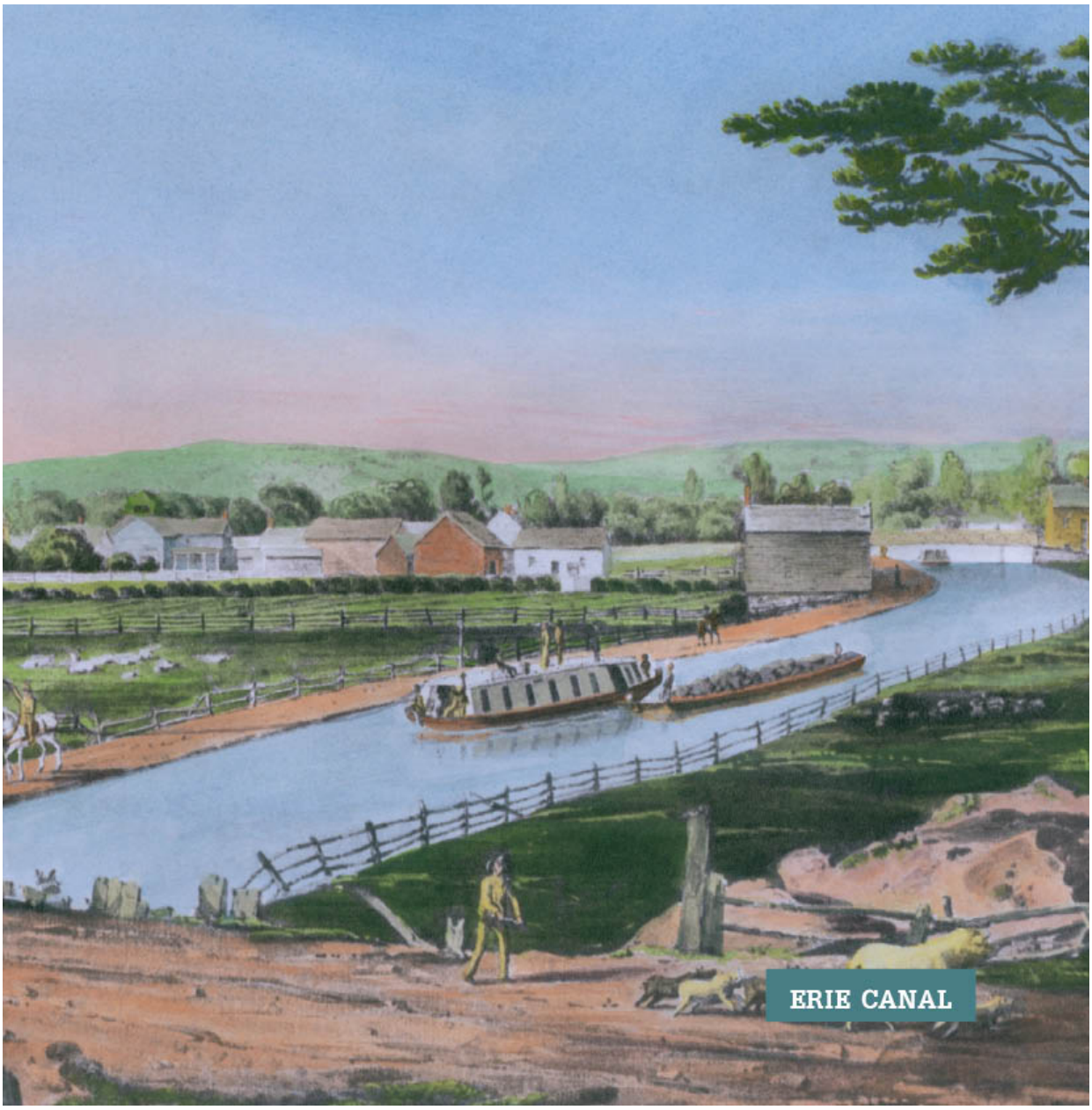
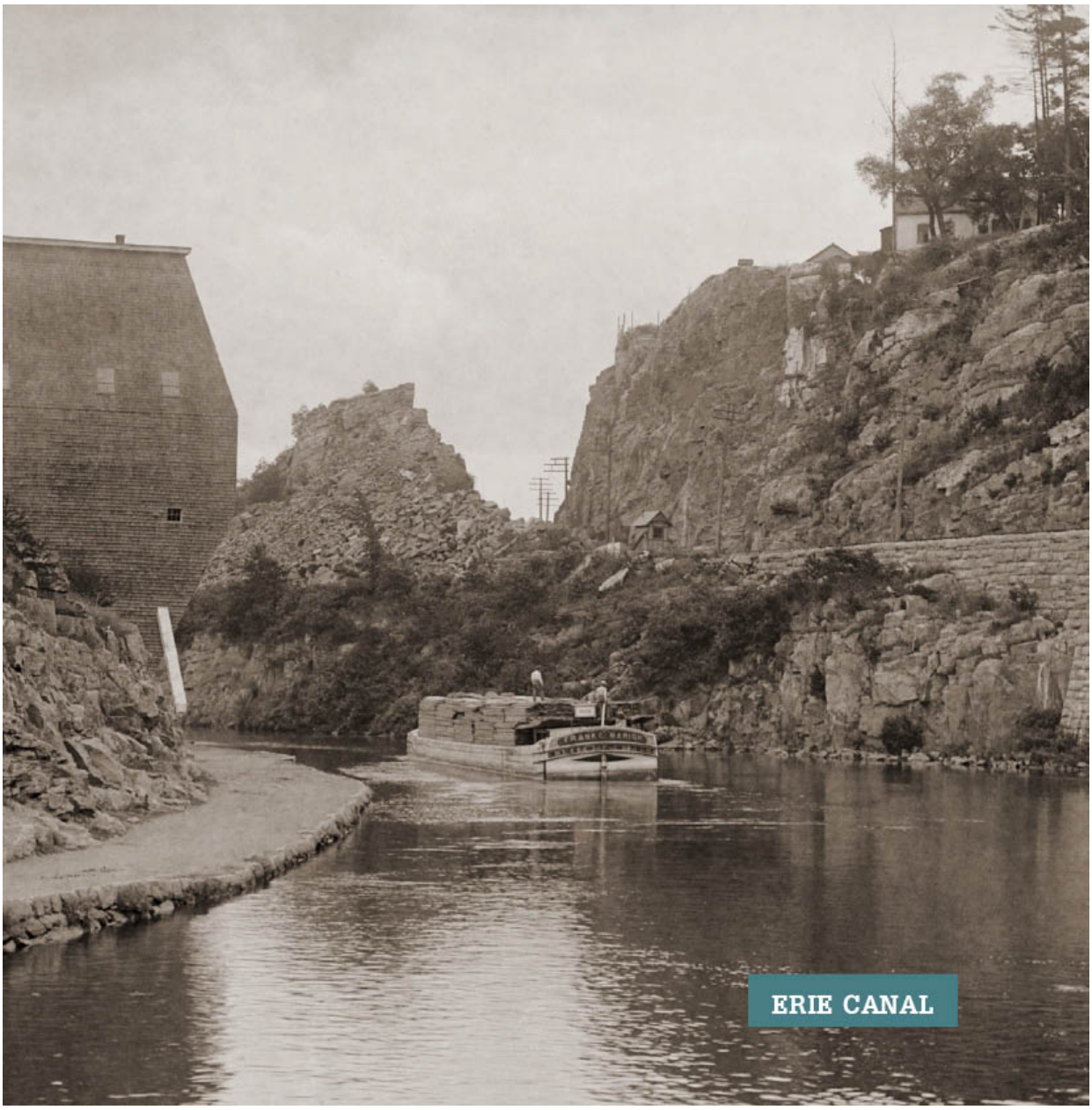

ERIE CANAL

THE BIRTH OF CANALS

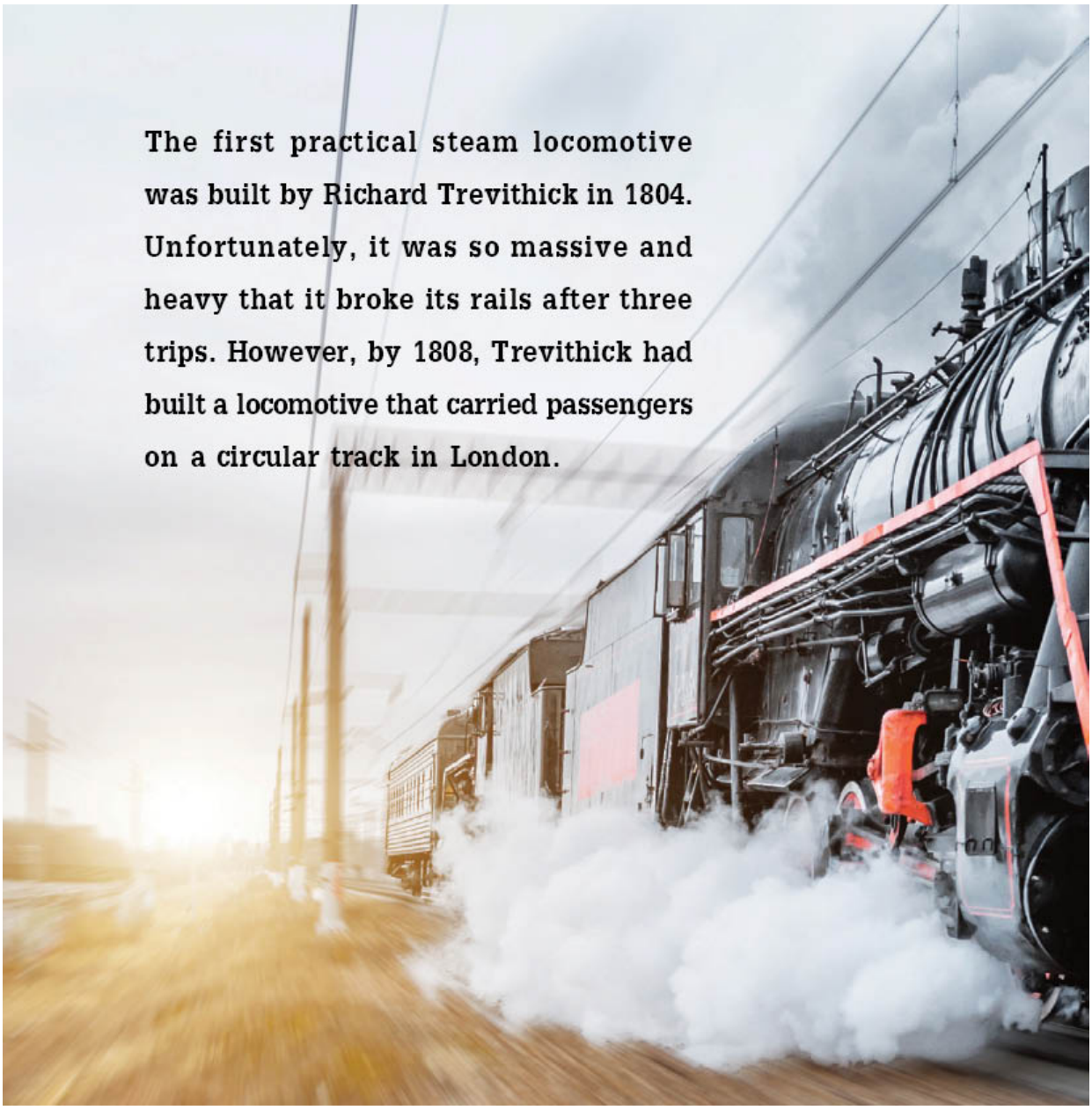
Depending on where natural waterways existed, they didn't always easily connect to each other. In order to make the connections easier, manmade canals were built. The Erie Canal was designed to create a route via water from the New York City coastline and the Atlantic Ocean to the Mideast's Great Lakes. When construction was completed in the year 1825, at 363 miles in length it was second only to China's Grand Canal.

It was important both for commerce and travel and increased New York's prosperity. It gave the port of New York a huge advantage over other ports in the United States. There was also a surge of canal building in Britain as well. By the year 1850, more than 4,000 miles of waterway – connecting canals had been constructed there.


ERIE CANAL

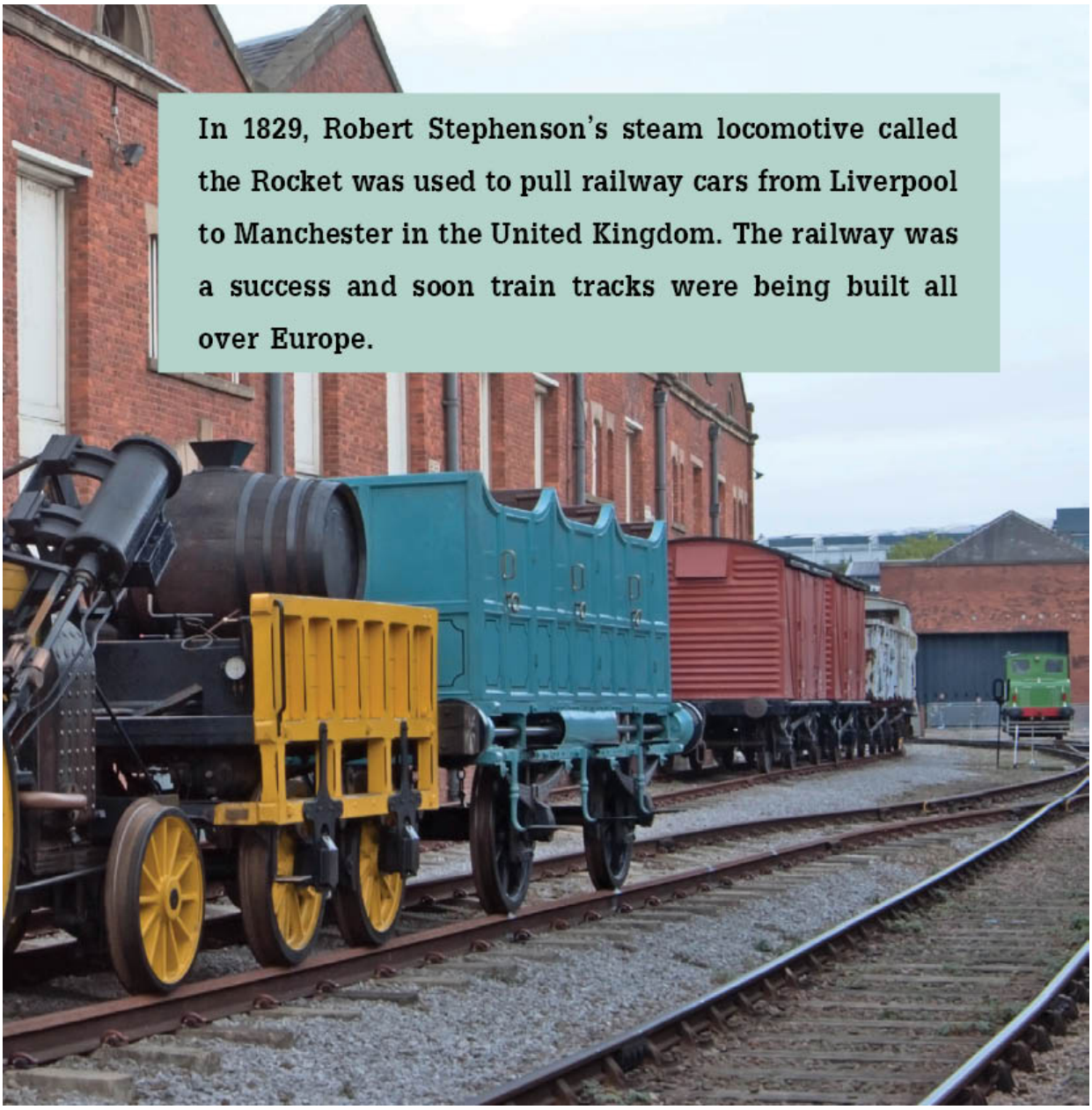
THE RAILROADS ARE BUILT

Even better for transportation than steamboats and the building of canals, was the advent of the steam locomotive. Trains weren't limited by natural or artificial waterways. Of course, tracks had to be built to get trains from one place to another and there were sometimes waterways or mountains to cross.



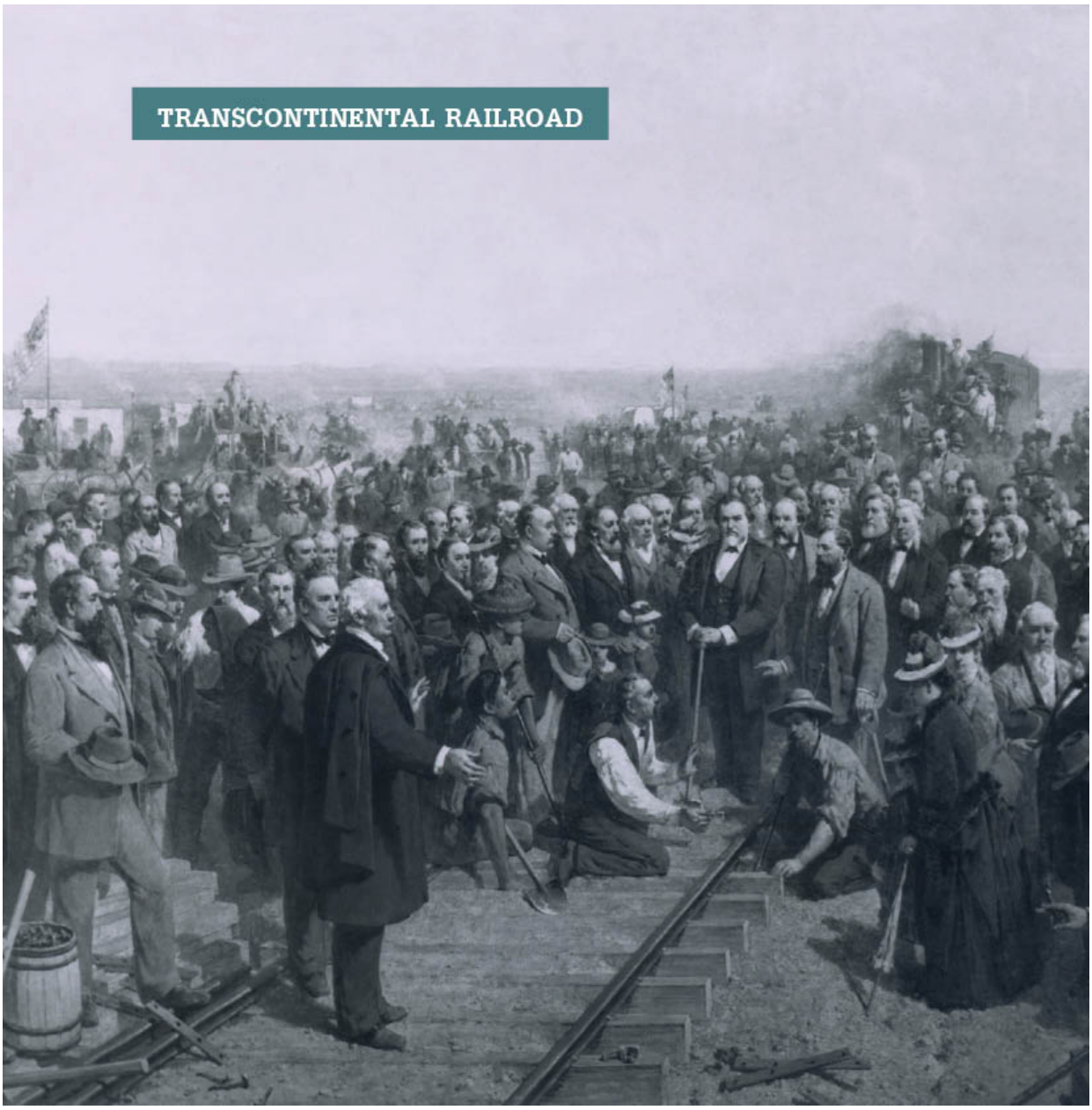
The first practical steam locomotive was built by Richard Trevithick in 1804. Unfortunately, it was so massive and heavy that it broke its rails after three trips. However, by 1808, Trevithick had built a locomotive that carried passengers on a circular track in London.

STEPHENSON'S ROCKET



In 1829, Robert Stephenson's steam locomotive called the Rocket was used to pull railway cars from Liverpool to Manchester in the United Kingdom. The railway was a success and soon train tracks were being built all over Europe.

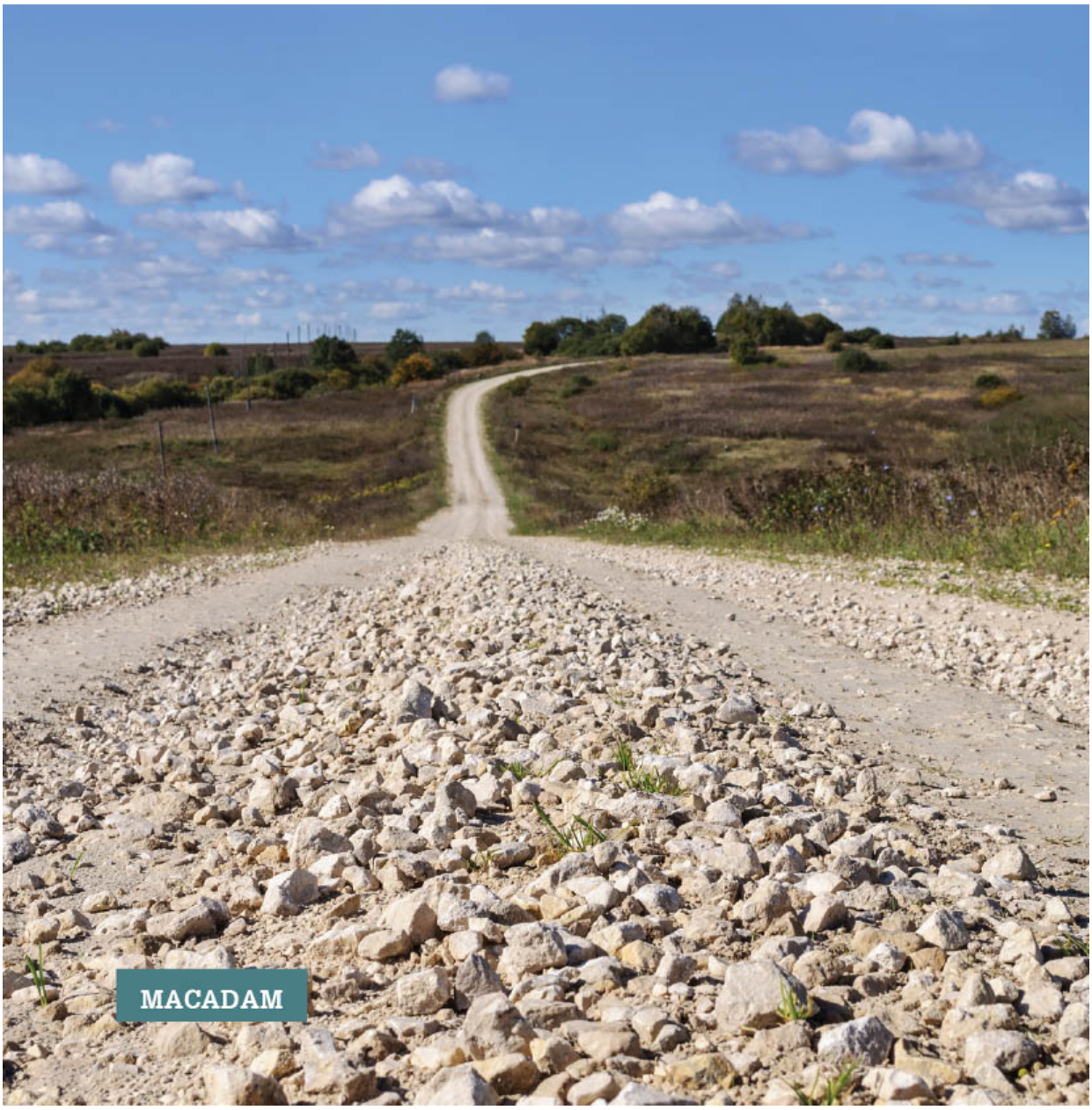
Around 1830, railways were being designed and built in the eastern region of the United States. One of the first was the Baltimore and Ohio railway. Its first section was launched in 1830. In less than 40 years, the first railway that connected the east coast to the west coast was completed.


TRANSCONTINENTAL RAILROAD

This First Transcontinental Railroad completely changed the vast expanse of the United States and made it "smaller" in a sense. Before the railways were in place, it would take months to travel from one coast to the other. The west coast seemed like a world apart from the east. The railway changed all that. In the 1870s, people and supplies could be transported coast to coast in a few days.

IMPROVED ROAD CONSTRUCTION

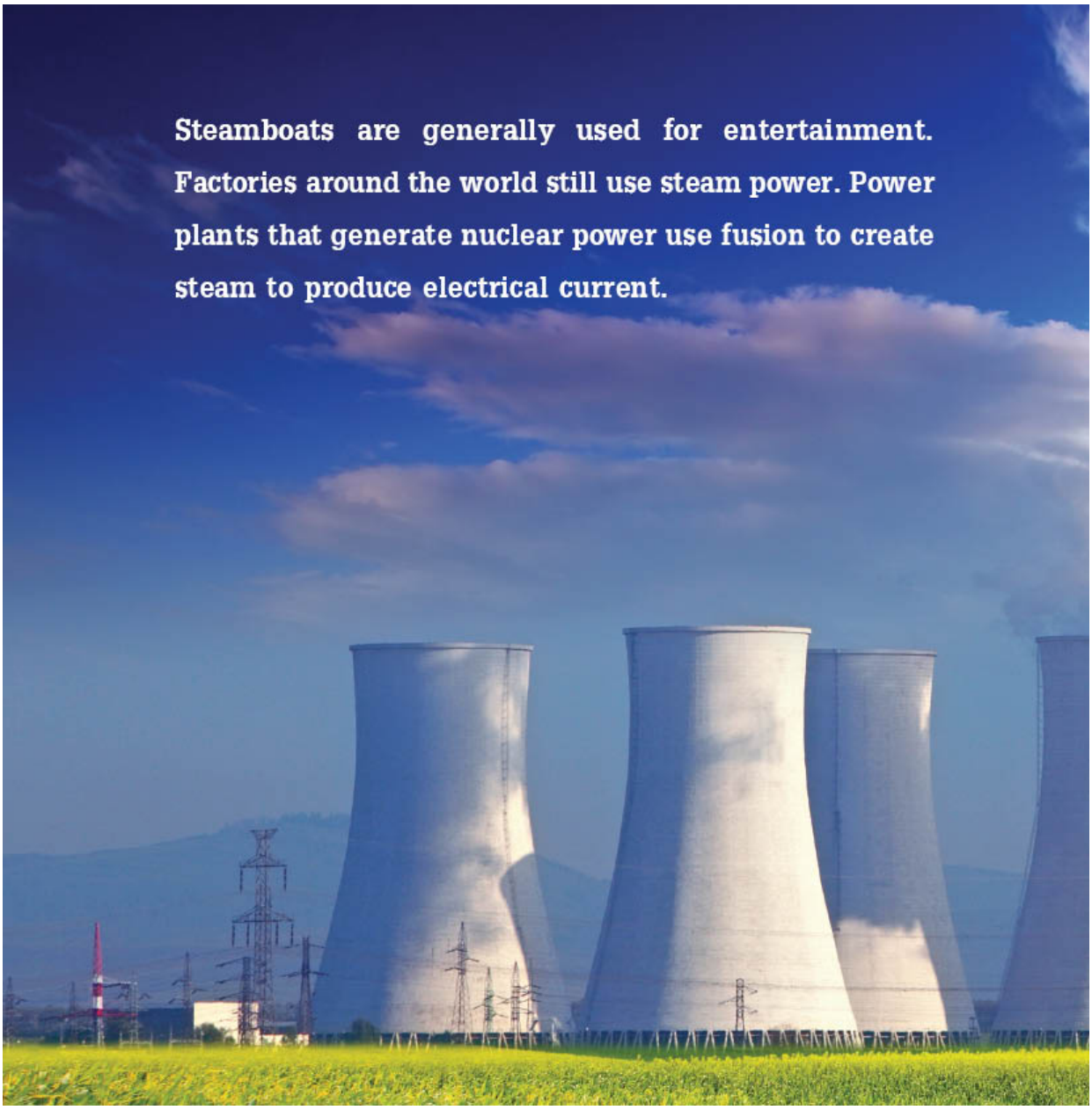
Even with these new forms of transportation there were still gaps and people still needed to use roads to get from place to place in horse-drawn carriages. Prior to the Industrial Revolution, roads were sometimes just made of dirt and they weren't maintained well at all. However, getting from place to place at a speedier pace than before became more important. A new process called "macadam," which allowed workers to create smooth roads made from gravel was introduced.

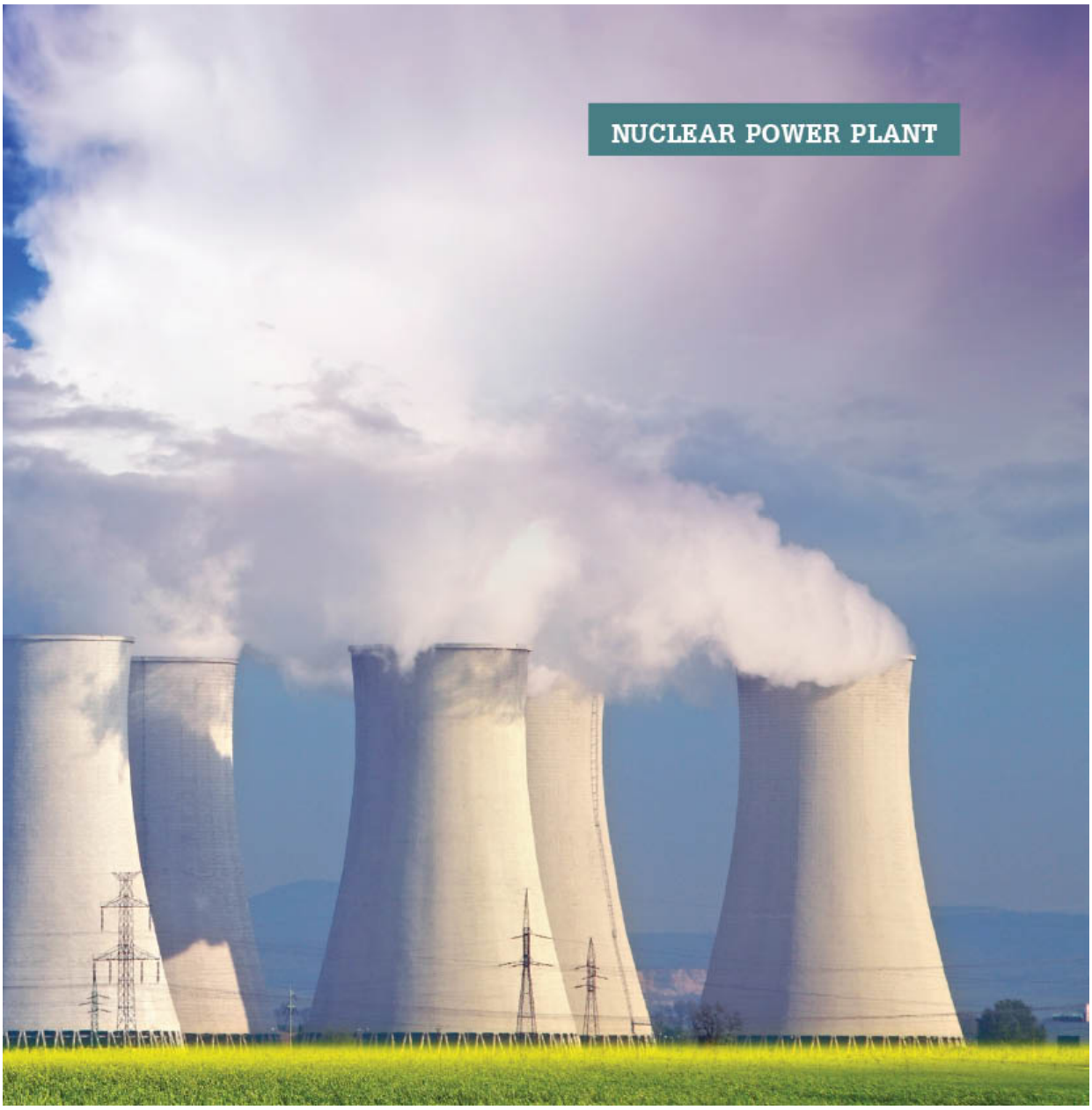

MACADAM


MODERN TRAIN

ARE STEAM ENGINES STILL IN USE TODAY?

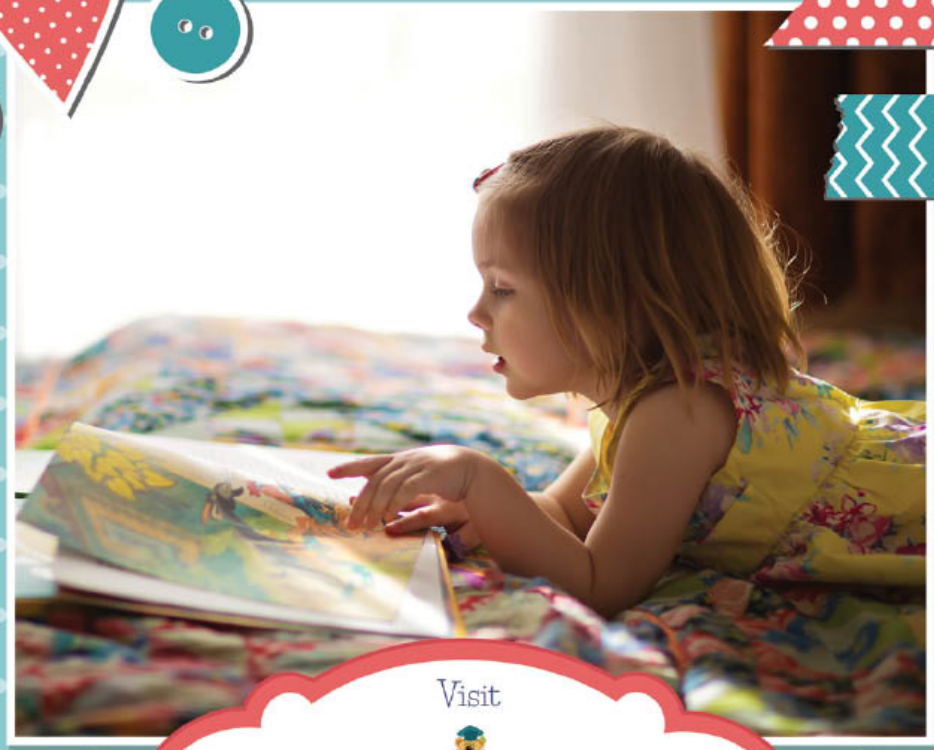
Most train engines today are powered by electricity or internal combustion engines that use either gas or diesel. There are a few places in the world that still use steam engines to power their trains and there are also antique locomotives for entertainment.


Steamboats are generally used for entertainment. Factories around the world still use steam power. Power plants that generate nuclear power use fusion to create steam to produce electrical current.


NUCLEAR POWER PLANT

INDUSTRIAL REVOLUTION AND ITS LEGACIES

During the Industrial Revolution there were many different inventions that had a huge impact. The invention of the steam engine made it possible to power machines in factories and completely changed transportation worldwide, both by steamboat and by trains run by steam locomotives.



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