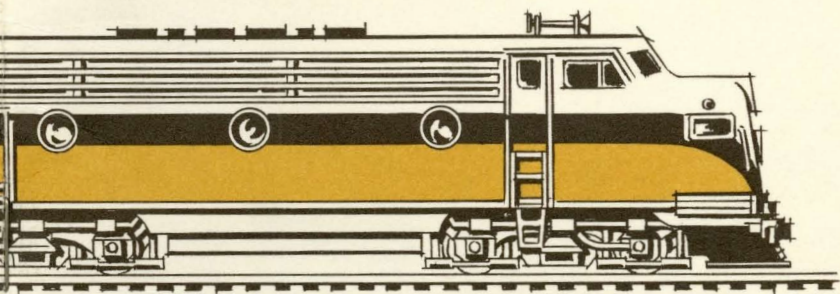
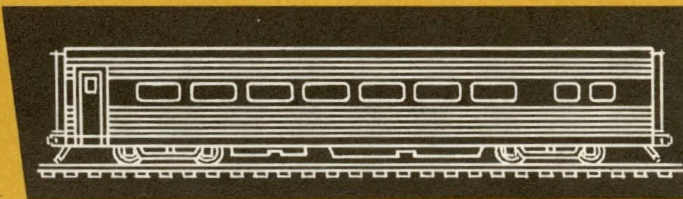
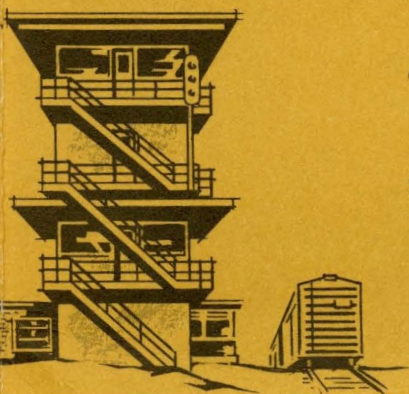


AMERICAN RAILROADS

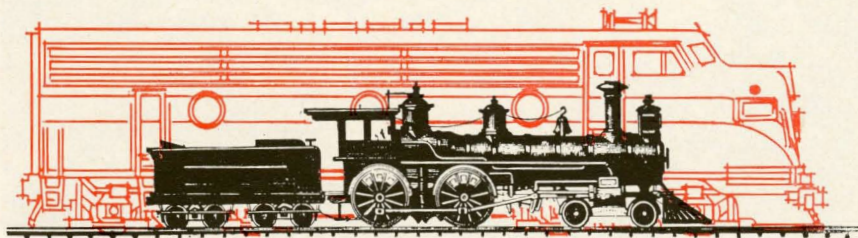
*Their Growth
and Development*



AMERICAN RAILROADS

Their Growth and Development

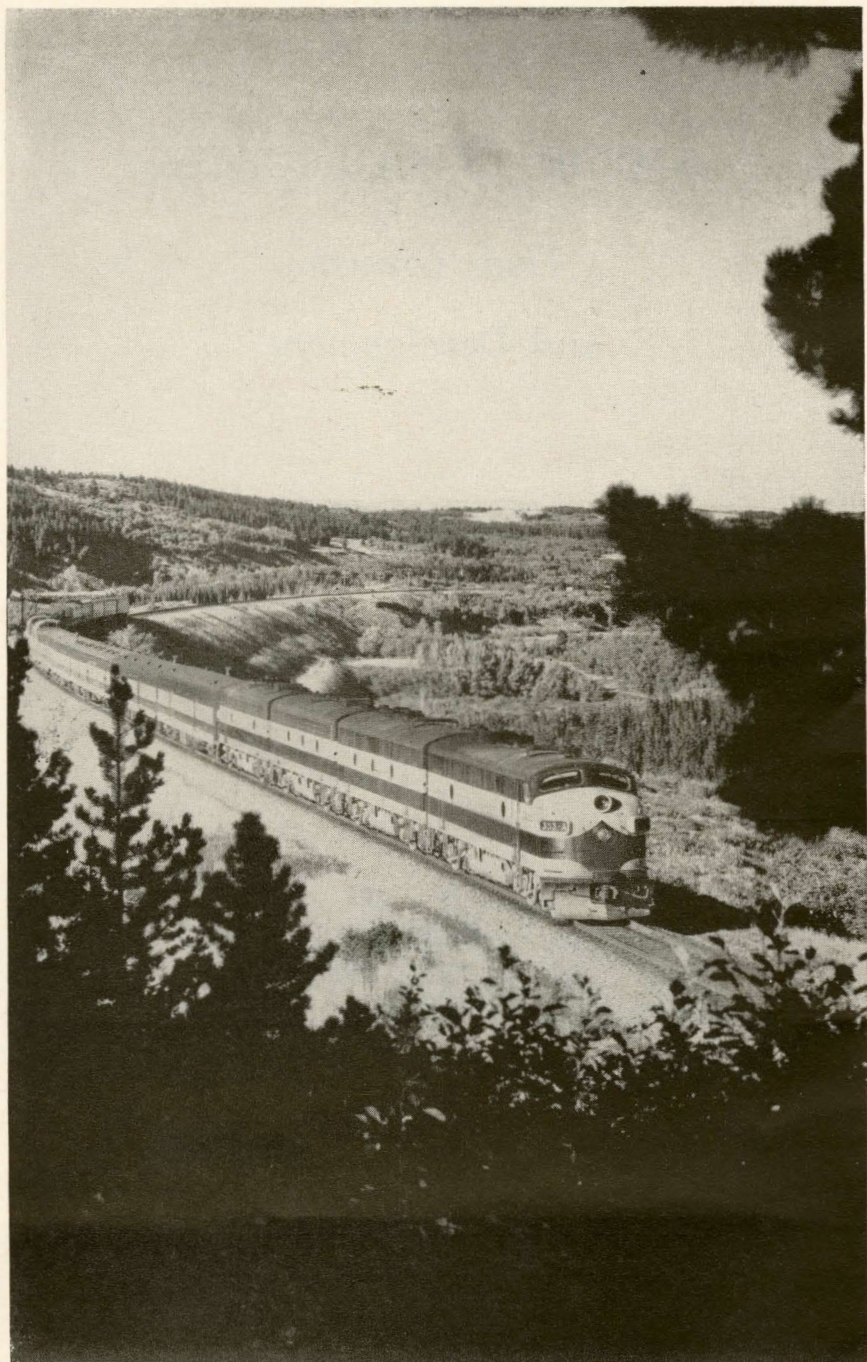
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ASSOCIATION OF AMERICAN RAILROADS

Transportation Building, Washington 6, D.C.

December, 1958



THE AMERICAN RAILROADS

OF all the forms of transportation which have been developed during man's onward march, the one which has contributed most to the spread of civilization, the creation and diffusion of wealth, the expansion of industries, and improvements in the standard of living, is the railroad. No other industry so fully enters into the everyday life of the American people.

To realize how true this is we have only to consider the important part which railway transportation plays in assembling the materials which go into the production of our homes, the furniture and furnishings with which our homes are fitted, the food we eat, the clothing we wear, and the many other things we use and see about us.

Many of these articles have been brought to us by rail—sometimes for thousands of miles—and if we should trace them back still further, we would find that railway transportation played an important part in assembling the raw materials from which most of them were made. So we see there is a close relationship between railway transportation and the comforts and advantages which we enjoy every hour of the day.

Moreover, railroads have been tremendously important from the broader standpoint of national development. Until the advent of railroads, the nation's inland commerce moved principally upon canals, lakes and navigable rivers when ice, low water or floods did not interfere.

On land, people were dependent upon the stagecoach for long journeys, and the Conestoga wagon for freight haulage. Travel and communication were slow, and the cost of transporting freight long distances by land was often prohibitive. Lack of efficient land transportation retarded agricultural and industrial development and confined trade to small areas.

Railroads Were the Pioneers

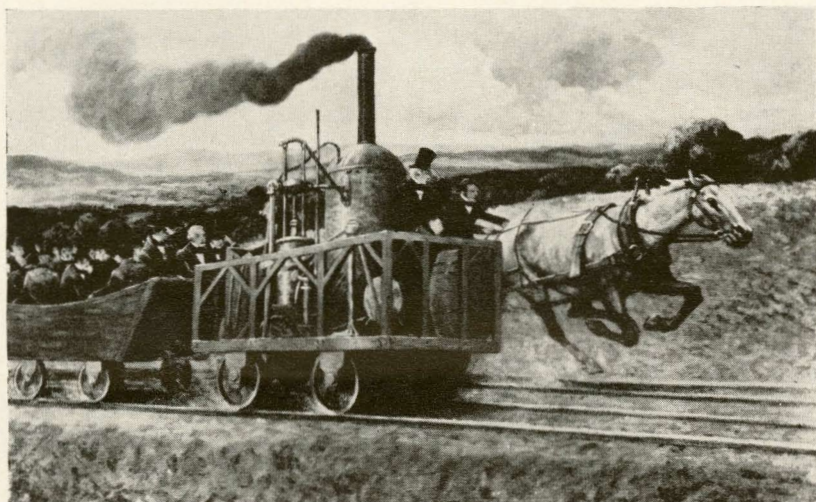
AS railroads spread across the nation, vast changes occurred. In many parts of the country railroads were the pioneers, opening immense regions to farming, mining, lumbering and manufacturing. In older parts of the country, with the coming of the railroads, communities took on new life and a new outlook.

Wherever the rails were laid down, towns sprang into being, industry took root, commerce developed, communication was speeded up, agricultural production increased, and land values were multiplied. Distance no longer was a barrier to trade. Railroads founded and developed new markets for producers, new sources of supply for consumers.

When the first common carrier railroads were opened, in 1830, there were less than thirteen million people in the United States—nearly all located in the area east of the Mississippi River. In the entire region west of the Mississippi River, including the Pacific Coast area, there were fewer people than there are today in the city of Richmond, Virginia. In the entire country, there were then only five cities of more than 25,000 inhabitants—New York, Philadelphia, Baltimore, Boston, and New Orleans—all located on or near the seacoasts. Today, there are about five hundred cities with populations ranging from 25,000 upward, and they are distributed throughout the country. Industrial and agricultural growth has been equally striking.

Railroads Carry Everything

OF course, it would be absurd to suggest that the railroads alone have brought this country to its present state of development. Many factors have contributed to the nation's growth and progress, but students of American history agree that the railroads have played a major role in the building of our nation.



Historic Race of Peter Cooper's "Tom Thumb" and a Horse, 1830.

Why, one may ask, has the railroads' contribution to economic progress been greater than that of other agencies of transportation? The answer is that railroads go everywhere, they carry everything, and they perform their transportation service without interruption at all seasons of the year. They handle bulk freight, package freight, perishable freight, passengers, express, and mail. Their service can be made to fit every transportation need. It is speedy, cheap, and more dependable than that of any other mode of transportation.

Then, too, railroads are great industries in themselves. Wherever the railroads go, they become large local investors, and they become important local taxpayers. They build and maintain station buildings, repair shops, yards, and supply depots. They provide regular employment to local workers.

Moreover, railroads assure communities, cities, and industries more permanent transportation service than does any other agency. When a railroad enters a community, it casts its lot with that community through thick and thin, at all seasons, year in and year out. It is this assurance of dependable all-year-round transportation that makes for permanent community growth and prosperity.

Beginnings of Railway Development

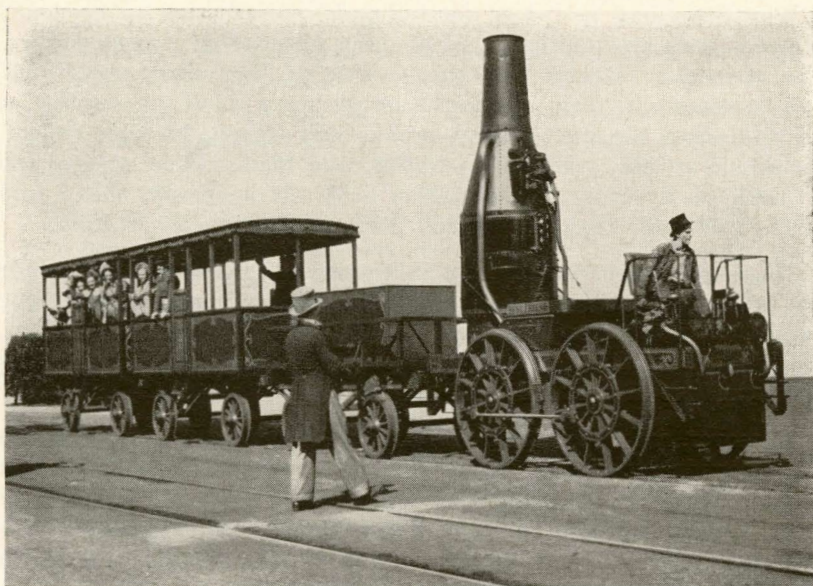
THE first locomotive to run on rails in the United States—or in the New World for that matter—was a small experimental engine built by Col. John Stevens and operated on a circular railway track at Hoboken, N. J., in 1825. It was never put to practical use.

The first locomotive to run on a standard railroad in the United States was the British-built *Stourbridge Lion*. On August 8, 1829, the *Lion*, operated by Horatio Allen, a young civil engineer, was tried out on a short, wooden railroad in Pennsylvania.

In September of that year, the *Tom Thumb*, an experimental locomotive built by Peter Cooper of New York, was given a trial run on a newly-built railroad at Baltimore, Maryland. This little engine, weighing about one ton, was the first American-built locomotive to run on a common carrier railroad in this country.

Meanwhile, the pioneer railroad of the South was getting under way at Charleston, South Carolina. In December, 1830, scheduled steam passenger service—the first in America—was introduced on that road.

The first train was powered by the 3½-ton locomotive *Best Friend of Charleston*, built at the West Point Foundry, New York City, and shipped to Charleston by sailing vessel. The *Best Friend* was the first locomotive to pull a train of cars on an American railroad.



The "Best Friend of Charleston"—First Engine to Pull a Train of Cars in America.

The opening of the first railroads in Maryland and South Carolina in 1830 marked the real beginning of the railway era in America. These railroads, although beset by many perplexing problems, demonstrated the superiority of railroads over other forms of transportation and brought forward-looking citizens to a realization that here was a mode of transportation which had immense possibilities because of its comparative cheapness, its adaptability to the many needs of trade and commerce, its promise of speed, and its ability to provide all-year-round service.

By 1835 more than two hundred railway charters had been granted in eleven states and more than a thousand miles of railroad had been opened for operation. Only a few of the many early companies succeeded in actually building railroads, and still fewer companies survived for any considerable length of time. However, railroads were built in Ohio, Michigan, Indiana, Illinois, Kentucky, Tennessee, Alabama, Mississippi and Louisiana, as well as in states bordering the Atlantic Ocean. In some instances these small railroads of the 1830's formed the nuclei for, or later became parts of, the important railway systems of today.

By 1850, there were more than 9,000 miles of railroad in the United States. The railroads of that day were short, but many of them were

connected with other lines to form through routes of travel and commerce. For instance, in 1850 one could travel by rail all the way from Waterville, Maine, to Buffalo, New York, by using some twelve different railroads and changing cars several times en route. Such a journey required about four days—considerably more time than is now required to travel by train from coast to coast.

Federal Land Grants to Pioneer Railroads

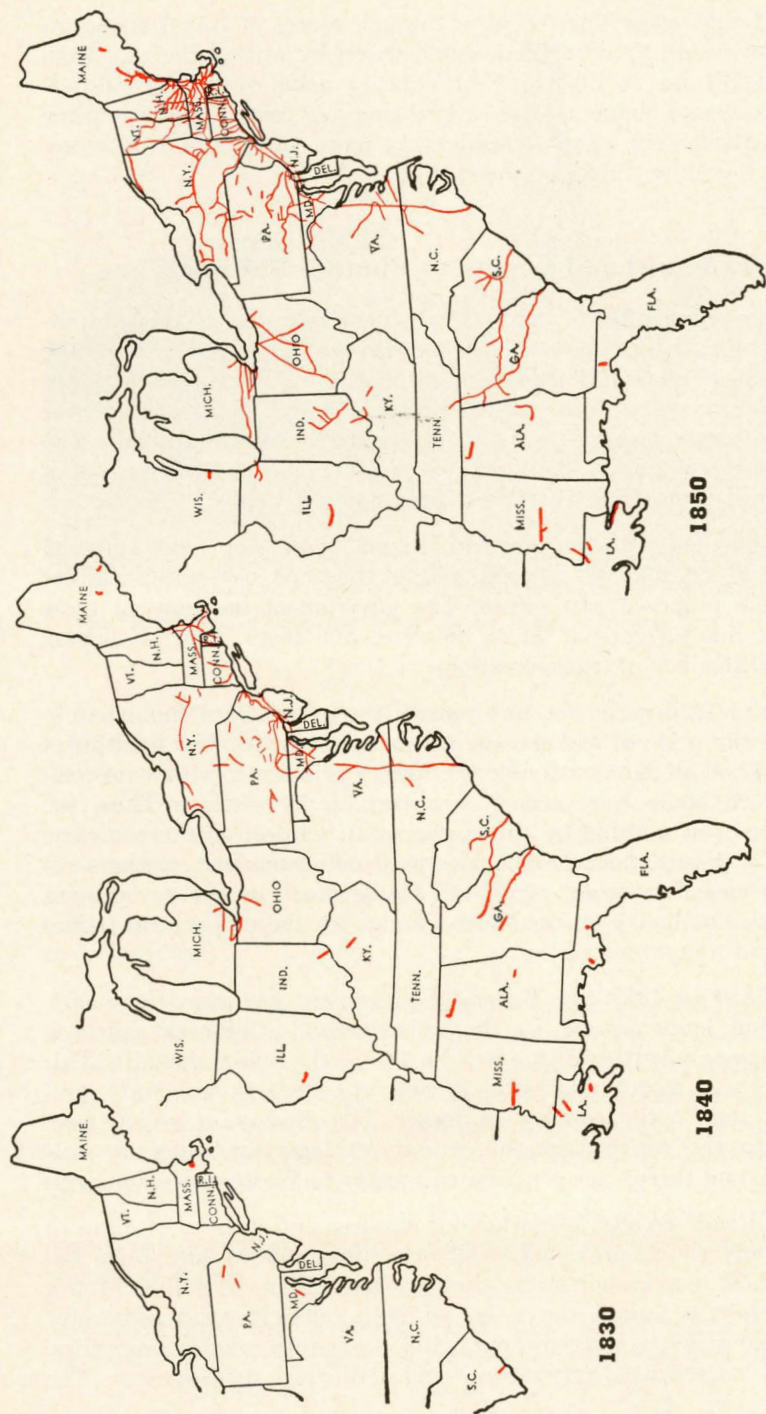
FOR many years the Federal Government followed a policy of encouraging the development of highways and canals through the public domain by granting sections of land along the proposed routes to help defray the cost of construction. In 1850, Congress passed the first land-grant measure to aid in the construction of railroads. The specific purpose of the Act was to promote the construction of a through rail route from the Great Lakes to the Gulf of Mexico.

This Congressional land grant to Illinois, Mississippi and Alabama consisted of alternate even-numbered sections for six miles on either side of the proposed rail routes. The government had offered these lands for many years at \$1.25 an acre, but there were no buyers because of the lack of transportation.

When the land-grant act was passed, the government immediately advanced the price of the acreage which it retained in the land-grant strips to \$2.50 an acre, or double the former price, and, with a railroad assured, the lands were eagerly snapped up by settlers. Thus, the government lost nothing by this exchange of values; on the contrary, it actually gained because the alternate odd-numbered sections retained in each land-grant strip sold for as much as the government had asked, but had been unable to obtain, for the entire strip before the railroad was projected.

From 1850 to 1871, the Federal Government continued its policy of granting lands to aid in the construction of pioneer railroads through sparsely-settled or unsettled areas of the public domain. This method proved highly successful to both the Federal and State governments and to the country at large. The land-grant policy gave impetus to the construction of several strategically important railway lines, and these lines contributed greatly to Western development.

The railroads created a market for hundreds of millions of acres of public lands which previously had been unsalable at any price because of lack of transportation; they created billions of dollars of new wealth; they enhanced the value of both publicly- and privately-owned lands; they converted nontaxable areas into taxable properties, and they accelerated agricultural and industrial development. The

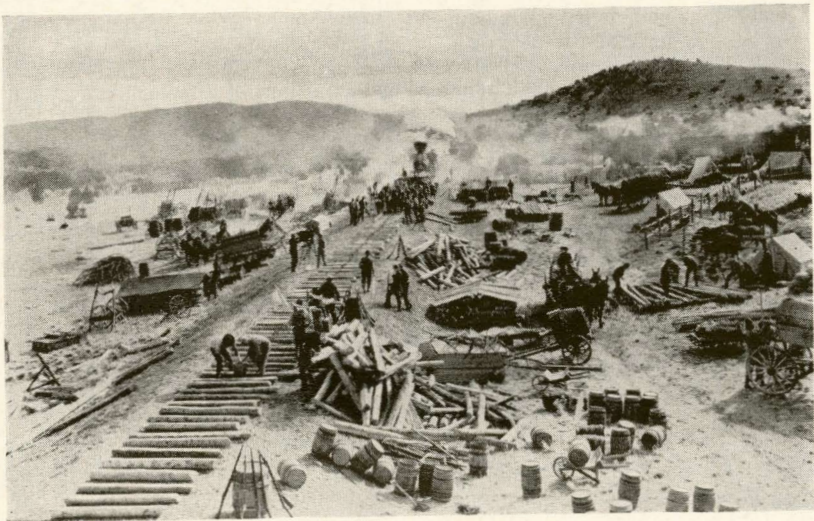


The early stages of railway development in America are shown by this set of maps. During the decade 1830-1840, the total length of completed railroad lines increased from 23 to 2,808 miles, and during the next ten years, more than 6,200 miles of railroad were opened, bringing the total network up to 9,021 miles in 1850. The most intensive growth during this period was in the Atlantic Seaboard states. In 1830, a trip from Boston or New York to Chicago was made by rail and lake steamers or by stagecoaches, and required several days. One could travel all the way from Boston to Wilmington, North Carolina, by rail, with several changes of cars and a few ferry trips en route. During the first twenty years of railway development, covered by these maps, the population of the United States nearly doubled.

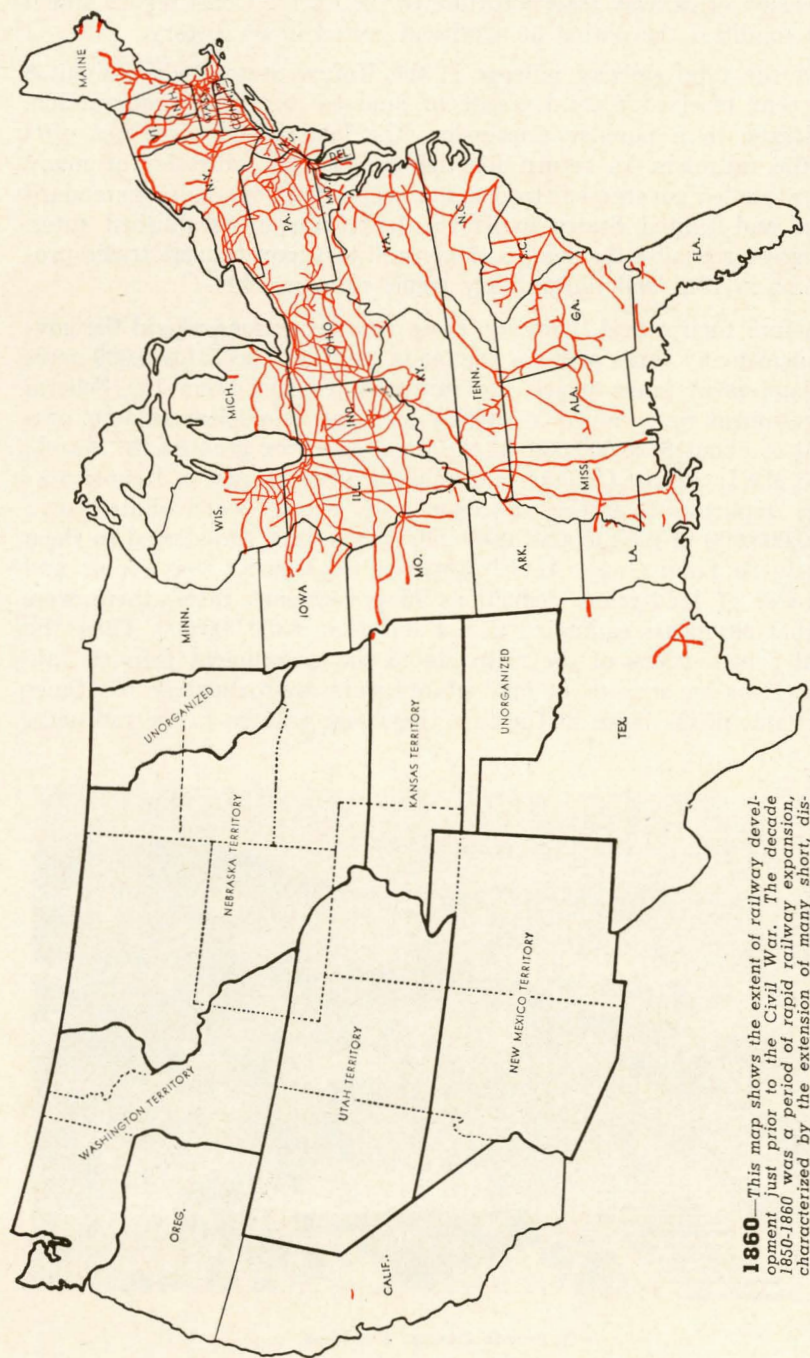
extension of railway transportation to the Pacific Coast region united and solidified the nation at a critical period in its history.

Of the total railway mileage in the United States today, about 8 per cent received federal grants of land as an aid to construction. Contrary to a popular impression, the land grants were not *gifts* to the railroads. In return for the grants, the railroads for many years carried government troops and property at one-half of standard rates and United States mails for four-fifths of established rates. Congress repealed the mail and non-military government traffic provisions in 1941 and the military traffic rates in 1946.

Before their repeal, however, these rate deductions repaid the government many times over for the lands granted. The 131,000,000 acres of land-grant lands which the railroads received from the Federal Government were valued at slightly less than one dollar an acre, or a total of about \$125,000,000, at the time they were granted. In March, 1945, the Interstate Commerce Committee of the House of Representatives reported that the railroads had already "contributed over \$900,000,000 in payment of the lands which were transferred to them under the Land Grant Acts." Between the time of that report and the end of land-grant deductions in government rates, there were further payments estimated at not less than \$350,000,000. Thus, the total contributions of the railroads to the government through rate deductions on account of land grants were approximately ten times the value of the lands at the time they were granted to the railroads.



Railroads Opened the West.



1860—This map shows the extent of railway development just prior to the Civil War. The decade 1850-1860 was a period of rapid railway expansion, characterized by the extension of many short, disjointed lines into important rail routes. This decade marked the beginning of railway development in the region west of the Mississippi River. By 1860, the "Iron Horse" had penetrated westward to the Missouri River and was beginning to make itself felt in Iowa, Arkansas, Texas, and California.



Driving the Golden Spike in 1869.

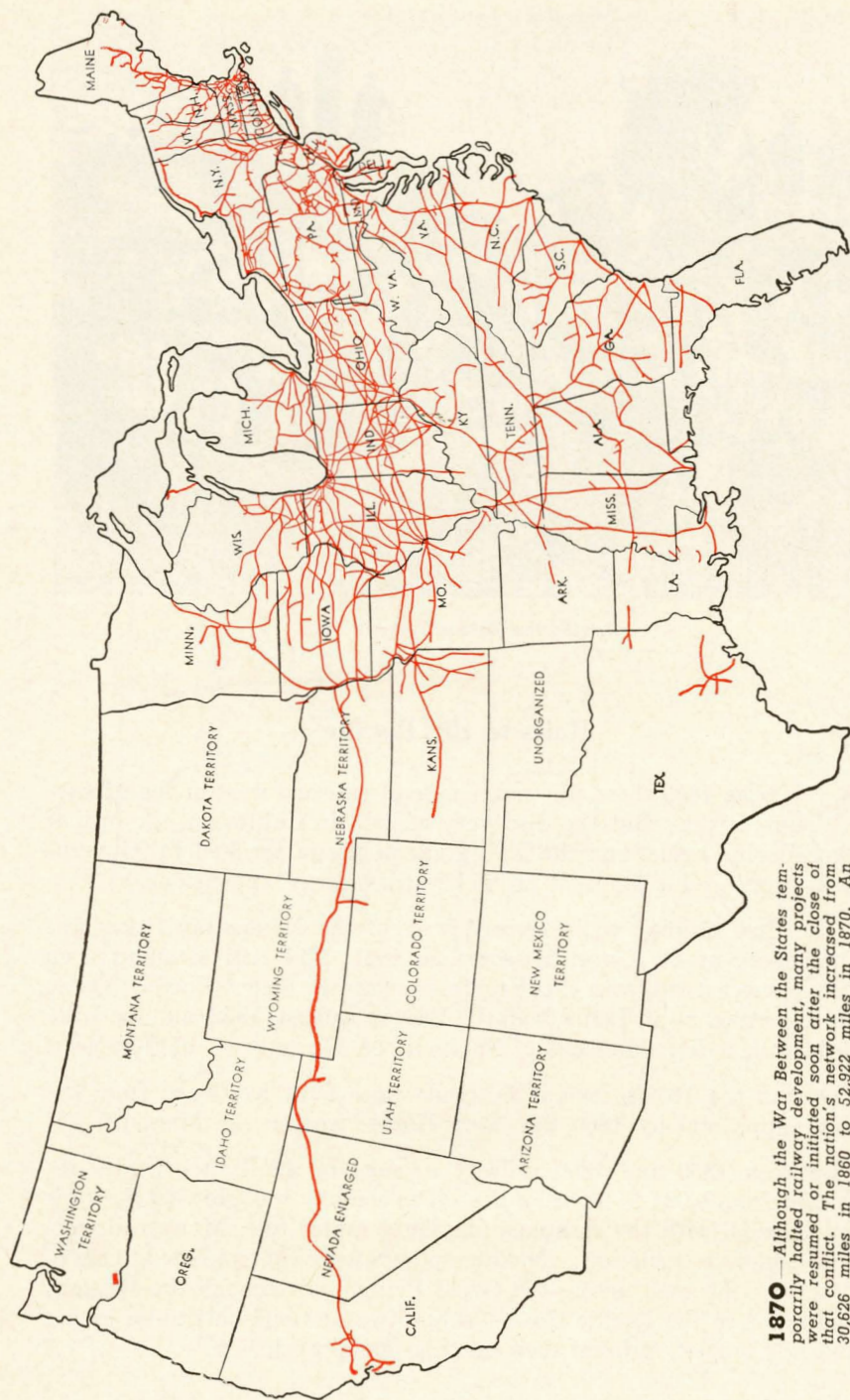
Rails to the Pacific

AS late as 1850 there was not a mile of railroad west of the Mississippi River. But the discovery of gold in California, the lure of trans-Pacific trade, and the land-grant policy of the Federal Government were giving impetus to westward railway expansion.

The first railroad to be opened west of the Mississippi River was commenced at St. Louis, Missouri, in 1851. The first locomotive on that pioneer road was the *Pacific*, sometimes called *Pacific No. 3*, which arrived at St. Louis from the East in August, 1852, and made its initial run a few miles out of St. Louis on December 1 of that year.

During the 1850's several railroads were built westward from the Mississippi, and by 1860 the "Iron Horse" was on the Missouri.

Between 1850 and 1860 railway mileage in the United States increased from 9,021 to 30,626 miles. The country was growing by leaps and bounds, with the railroads playing a major role. Many railroads were under construction; numerous others were contemplated. One of these was the road across the Great Plains and through the Western mountains to the Pacific Coast—a line two and one-half times longer than the longest railroad then existing in the world.



1870—Although the War Between the States temporarily halted railway development, many projects were resumed or initiated soon after the close of that conflict. The nation's network increased from 30,626 miles in 1860 to 52,922 miles in 1870. An outstanding development of the decade was the construction of the first railroad to the Pacific Ocean, making it possible for the first time to travel all the way across the country by rail. Railway development in the Mississippi and Missouri valleys was especially notable during this period.

In 1863, President Abraham Lincoln fixed the eastern terminus of the proposed transcontinental railroad at Omaha, Nebraska Territory. In California, a company was organized to build a railroad eastward from Sacramento to meet the road from Omaha.

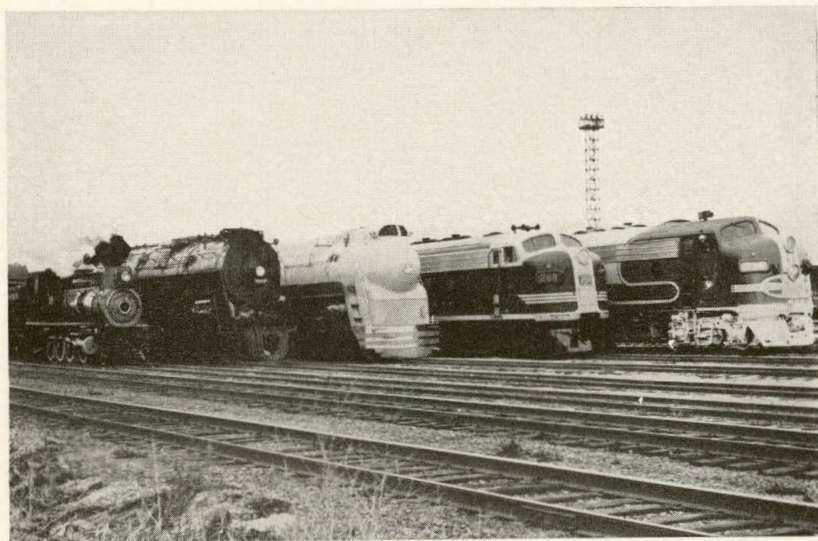
Ground was broken at Omaha and Sacramento in 1863, and construction was pushed with vigor. Tracklaying progressed with amazing speed. Boom towns mushroomed along the right-of-way as the tracks advanced. Swarms of land-hungry settlers followed in the wake of the rails.

Finally, on May 10, 1869, the construction forces met and the rails were joined at Promontory, north of Great Salt Lake.

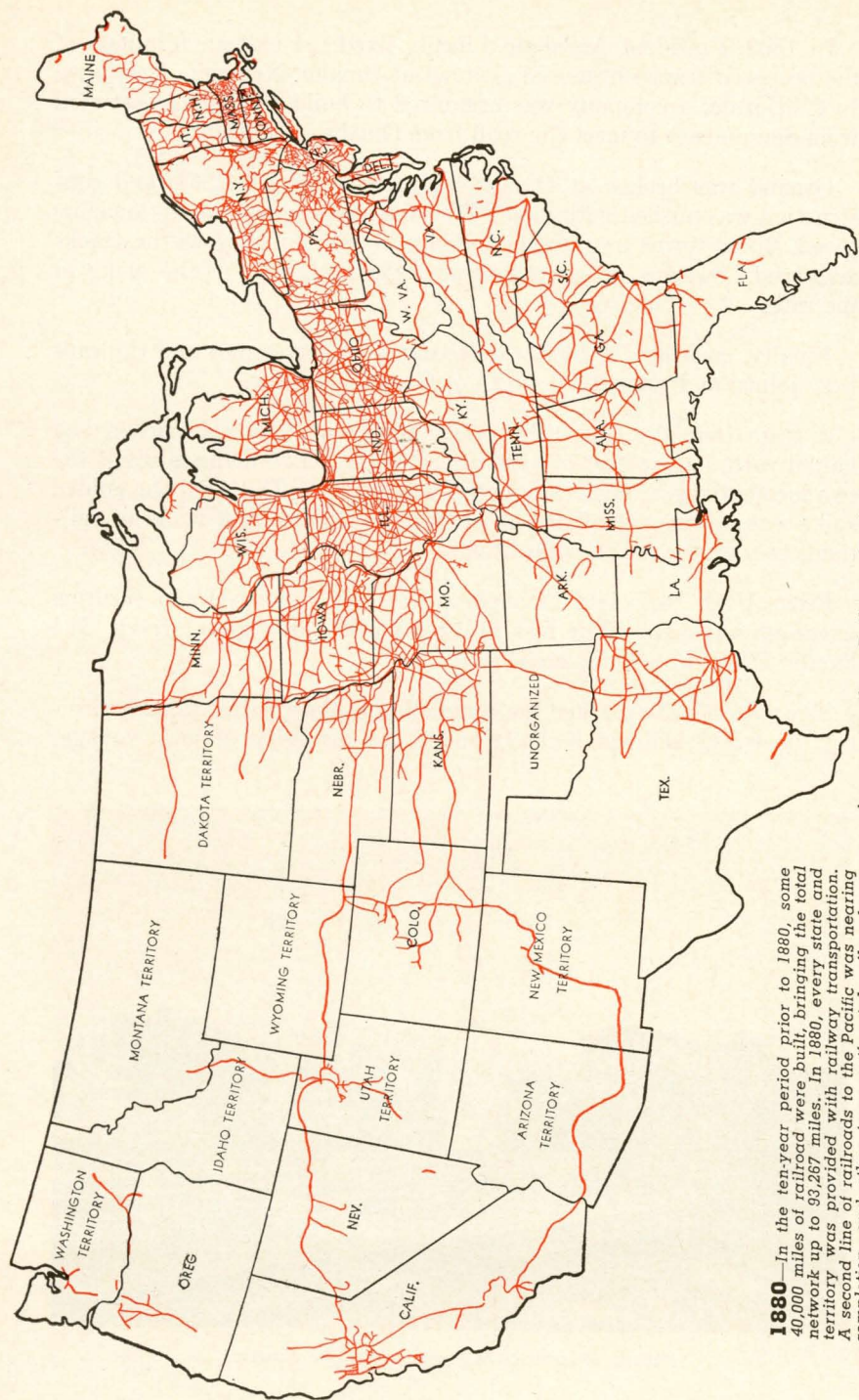
A train from the East and a train from the West approached and halted within a few feet of each other. Then, between the noses of the two locomotives, a memorable scene was enacted. The symbolic golden spike was driven, signaling the completion of the first chain of railroads to span the American continent!

From Utah to points throughout the nation flashed the thrilling telegraph message—"The last rail is laid. The last spike driven. The Pacific Railroad is completed!"

The golden spike marked the completion of the greatest railway project the world had yet seen. It ended the necessity of long voyages



Parade of Locomotive Power—Past and Present.



1880—In the ten-year period prior to 1880, some 40,000 miles of railroad were built, bringing the total network up to 93,267 miles. In 1880, every state and territory was provided with railway transportation. A second line of railroads to the Pacific was nearing completion, and other transcontinental railroads were under construction. Railway development was exerting a powerful influence upon immigration and agricultural and industrial growth throughout the country.

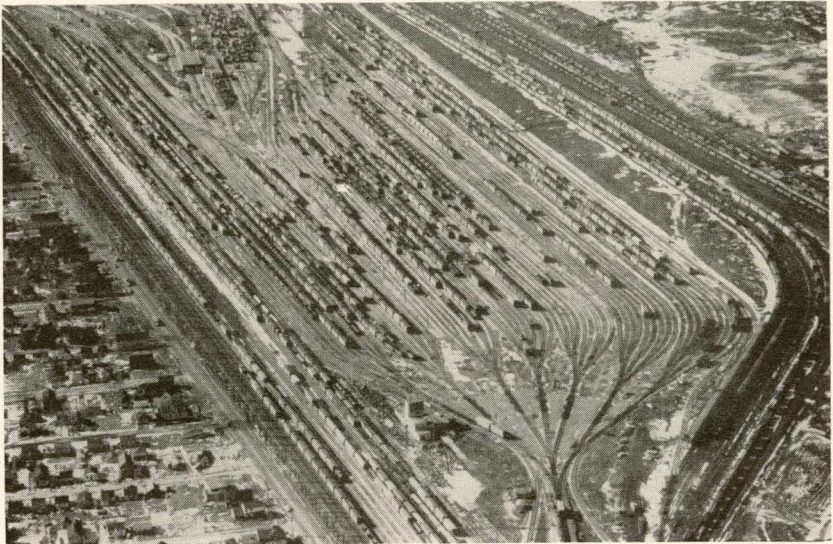
around Cape Horn. It brought an end to the journey by ship to the Isthmus of Panama, the trip through the jungle to the Pacific, and then by vessel to California. It also brought an end to the long and perilous overland trip by stagecoach or covered wagon.

The railroad united the East and the West—brought the cities of the Atlantic and the Pacific within a few days' journey of each other and opened up a vast and fertile region for settlement and development.

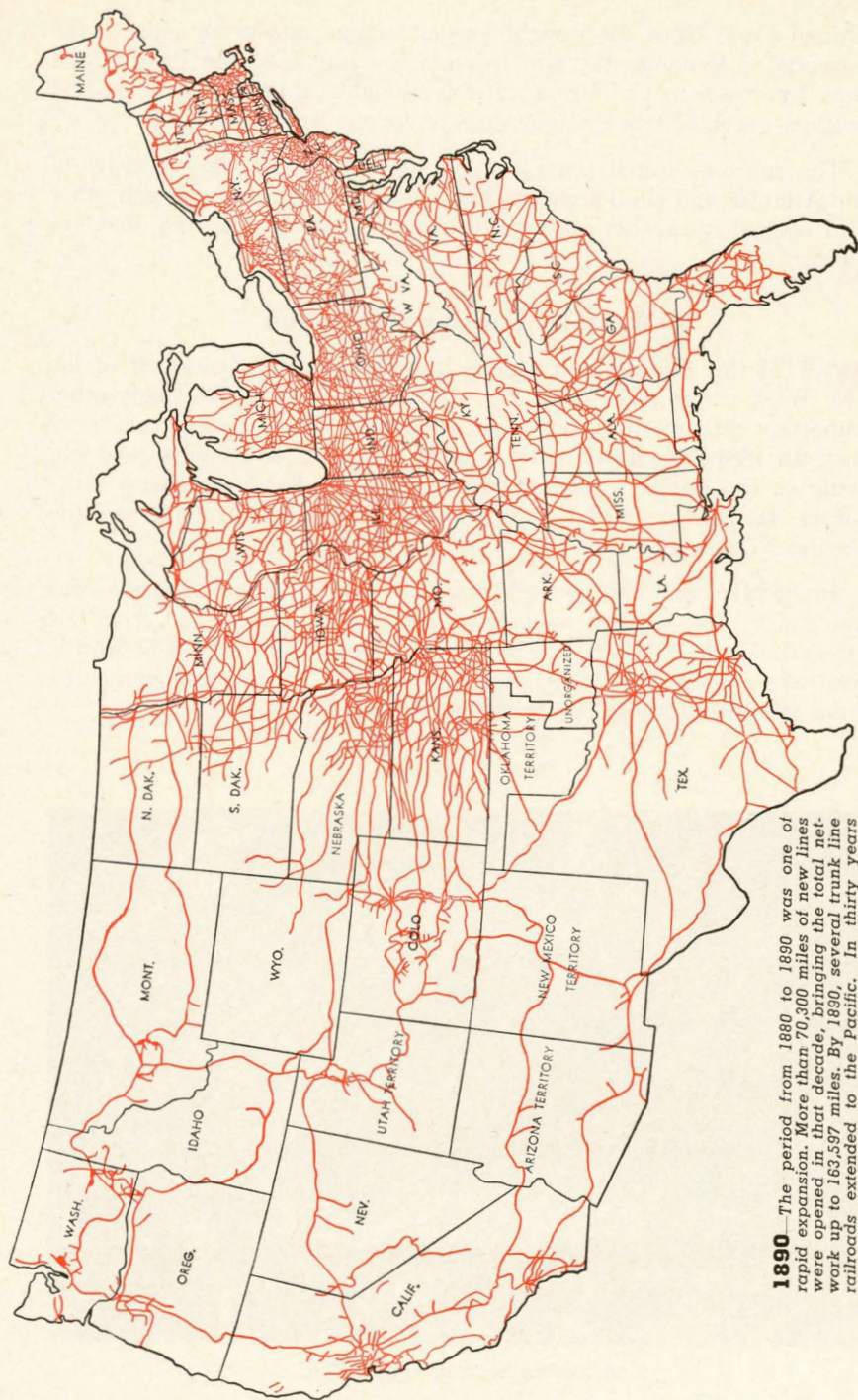
Western Railway Expansion

WITH the Atlantic and Pacific linked by rail, the conquest of the West was in full swing. During the 1870's and 1880's many other important railway lines were built, opening up large areas of rich territory. In 1881 rails were joined in New Mexico to form the second rail route to the Pacific Coast and the first direct line to southern California. In 1883 a railroad was completed between St. Paul and the Pacific Northwest.

In 1888 a Southern route between Chicago and California was completed, and in 1893 another great trunk line stretched from the Great Lakes to Puget Sound. Still another route to the Pacific Northwest was completed in 1909, and in 1910 a new rail line was completed from Salt Lake City to San Francisco Bay.



A Modern Railroad Freight Yard.



1890. The period from 1880 to 1890 was one of rapid expansion. More than 70,300 miles of new lines were opened in that decade, bringing the total net-work up to 163,597 miles. By 1890, several trunk line railroads extended to the Pacific. In thirty years from 1860 to 1890, the total mileage of the region west of the Mississippi River increased from 2,175 to 72,389, and the population of that area increased fourfold.

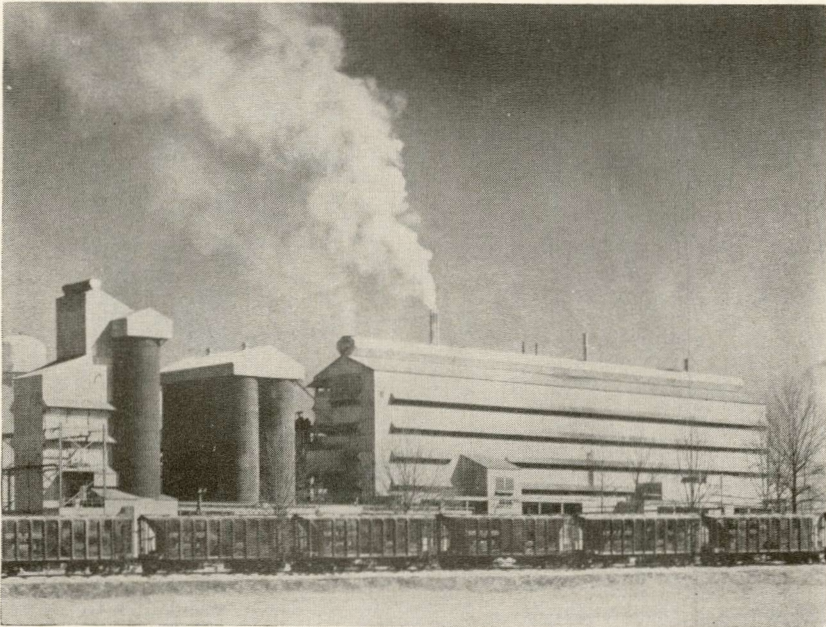
The decade 1880 to 1890 witnessed the most rapid railway expansion in American history. In that 10-year period, 7,030 miles of railroad a year were added—a total increase of 70,300 miles in a single decade!

This unparalleled expansion was not confined to the region west of the Mississippi. Railway mileage in Florida more than quadrupled during the 10-year period; that of Mississippi and North Carolina more than doubled; and that of Alabama, Georgia, Kentucky, Michigan, West Virginia and Wisconsin nearly doubled.

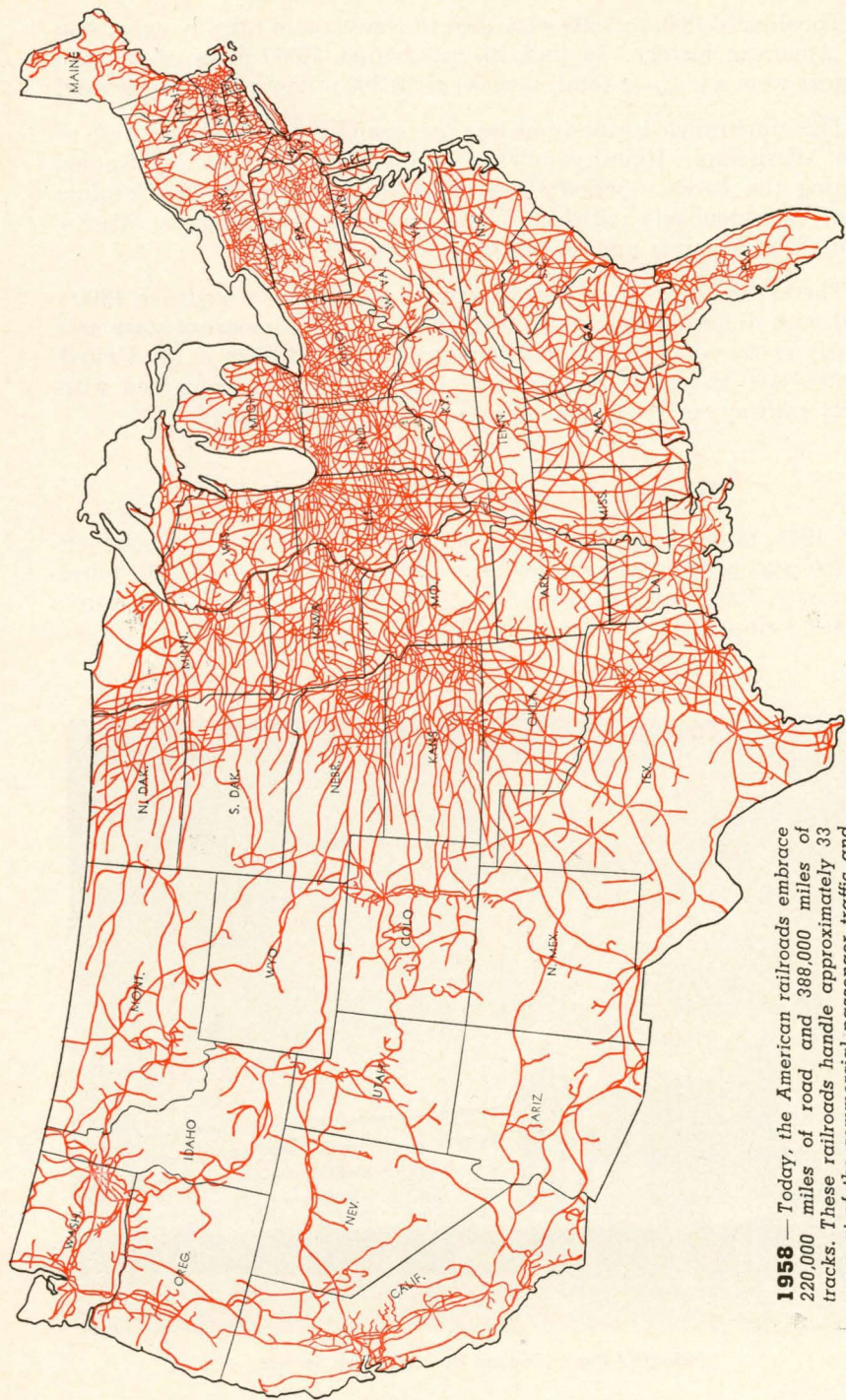
The expansion of the railway network continued through the 1890's and with diminishing pace up to 1916, by which time every state and nearly every county and every important city and town in the United States was served by one or more railroads and was provided with daily railway service to and from all parts of the country.

Increased Capacity of Railway Plant

IN 1916, railway mileage reached its peak—254,000 miles. Since then the aggregate length of road has dropped to about 220,000 miles. However, this does not mean that the railway plant has been retrogressing since 1916. The contrary is true.



Industrial Plants Depend Upon Railway Service.

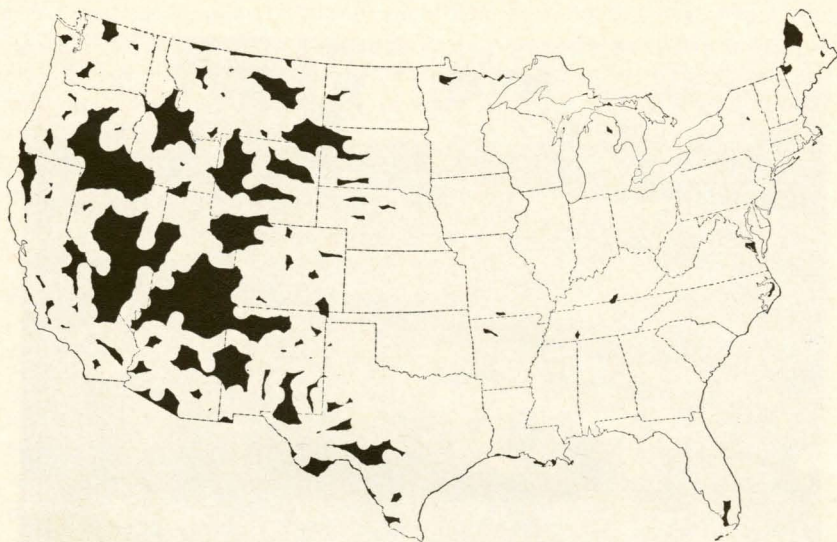


1958 — Today, the American railroads embrace 220,000 miles of road and 388,000 miles of tracks. These railroads handle approximately 33 per cent of the commercial passenger traffic and 45 per cent of the freight business of the nation, carry about 75 per cent of the United States mail and perform nearly all of the commercial express traffic of the nation. During World War II these railroads handled more than 90 per cent of the war freight and 97 per cent of the organized troop movements.

The earlier period of railway development was a period of pioneering, a period of rapid expansion, when lines were being pushed into virgin territory. Railway mileage increased rapidly during that period. When the country had been covered with a network of rail lines, expansion in new territory was virtually at an end. But with extensive agricultural and industrial growth of the territory served by the railroads, the need for intensive development of existing lines increased. Therefore, in the last third of a century the railroads have been engaged primarily in increasing the capacity and efficiency of the existing plant.

The railroads have not only increased their capacity through the construction of multiple tracks, additional yard tracks and sidings, industry tracks, larger shops, more powerful and more efficient locomotives, larger and better cars, improved signal and communication systems, the introduction of electronic devices, and so on, but they have improved their facilities in countless ways in the interest of increased comfort, convenience, speed, safety, and efficiency.

How the Railroads Serve the Population of the United States



Only the areas shown on this map in black are more than 25 miles (approximately one-half hour's drive) from a railroad. Students of geography will recognize that these are areas of sparse population.

Consolidation and Coordination

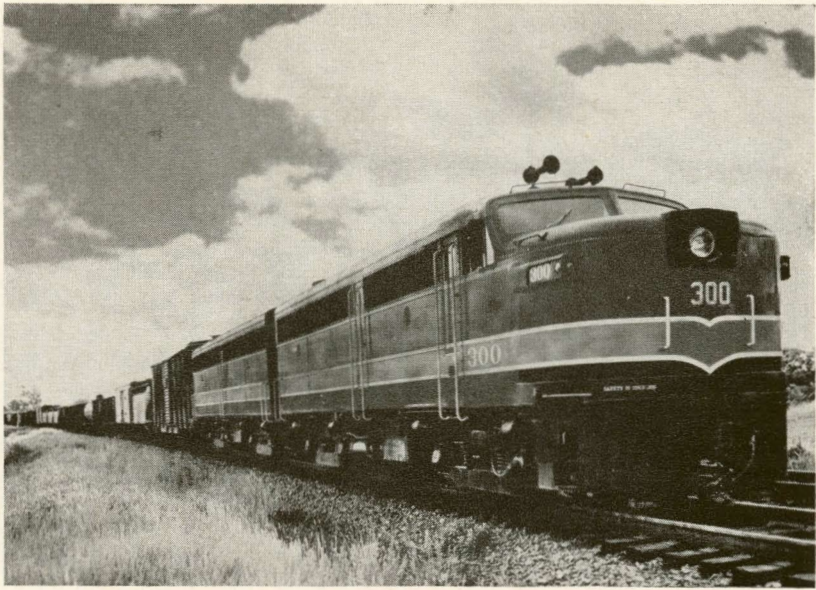
A MERICAN railway development has been in a constant process of evolution, trending toward unification, coordination, and consolidation of facilities and services. This trend has been dictated not only by the need for economy, but also by the need for providing uninterrupted travel and shipping services throughout the nation, and by the further need for adapting railway services to the ever-changing transportation demands of a fast-growing country.

Most of the large railway systems of today are the result of numerous consolidations. Before 1851, for example, eleven separate and distinct companies owned and operated the railroads composing the line between Albany and Buffalo, New York. All major systems today are made up of what were once scores, or even hundreds, of separate and distinct railway properties.

Consolidations have resulted in a gradual reduction in the total number of railway operating companies. In 1911, the Interstate Commerce Commission reported 1,312 operating railroads in the United States. At the beginning of 1958, there were 661 operating railroads, including switching and terminal companies, or about one-half the number in 1911. These hundreds of separate and distinct railway companies cooperate in numerous ways to furnish a complete continent-wide transportation service to the American people.



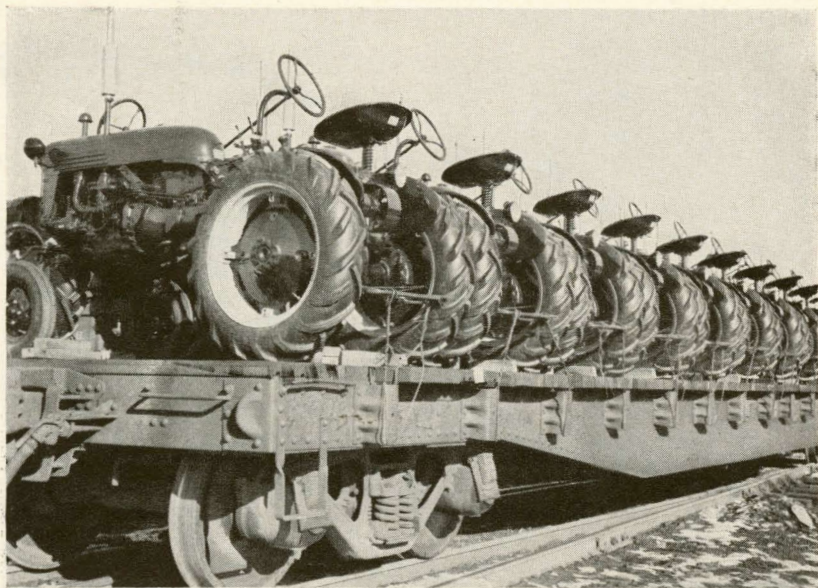
Railroads are Essential to the Mining Industry.



Railroad Associations

A REVIEW of the development of the American railroads would not be complete without some reference to the part which the Association of American Railroads and its predecessors have played in the direction of unification, standardization, and coordination of railway operations and practices. Shortly after the Civil War the railroads began to coordinate certain of their activities through meetings, conventions, and associations organized for the purpose of accomplishing certain things jointly which could not be done by each railroad working independently.

The name of the Association of American Railroads is comparatively new, but it is the "lineal descendant," so to speak, of the Master Car Builders' Association, formed in 1867 for the purpose of conducting tests and experiments looking toward the standardization of freight cars; the General Time Convention of Railway Managers, which pioneered our Standard Time system; and the Railway Association of America, formed in 1873 for the purpose of standardizing railway operations. These and other organizations of railroad men, working together for the betterment of the art of railroading, are now parts of the Association of American Railroads, which was created in 1934 by the merger of the American Railway Association, the Association of Railway Executives, the Railway Accounting Officers Association, the Bureau of Railway Economics, and other organizations.



Railroads and Agriculture Work Hand in Hand.

Adoption of Standard Time

THE Association of American Railroads and its predecessor organizations, forming the central research and coordinating agencies of the railway industry, are credited with many of the improvements which have marked railway developments during the last three-quarters of a century. One of the first of these improvements, as already mentioned, was the adoption of Standard Time. Prior to November, 1883, each railroad ran its trains by the local time of one or more cities on its lines, usually the city where it had its headquarters. There were at least 68 different local times by which trains were operated. On November 18, 1883, through the joint action of the railroads, these local times were resolved into four standard time zones in the United States (Eastern, Central, Mountain, and Pacific), with a difference of an even hour between them.

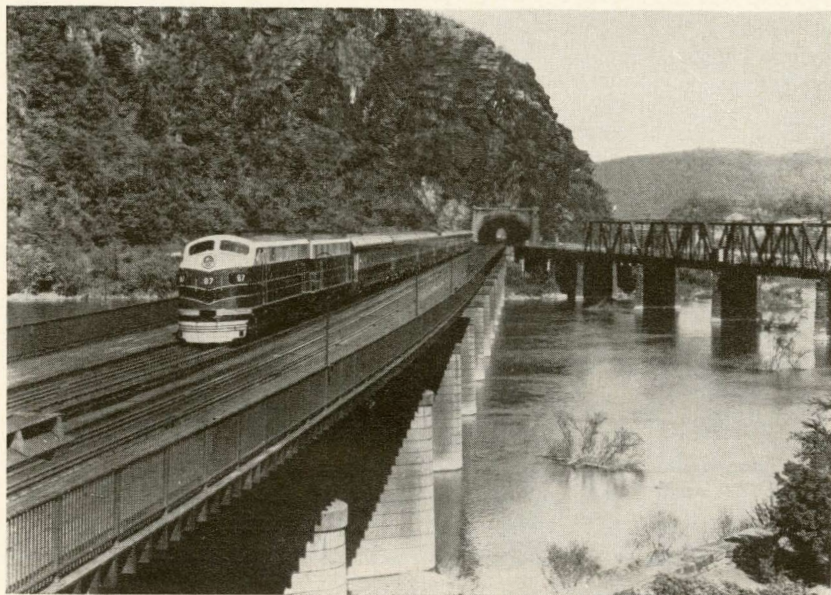
It is an interesting fact that this orderly method of reckoning time instituted by the railroads in 1883, although adopted and used by the Federal Government and the states, cities, and towns throughout the country, was put into effect without federal legislation of any sort. It was not until thirty-five years later—on March 19, 1918, during the first World War—that Congress passed what is known as the Standard Time Act.

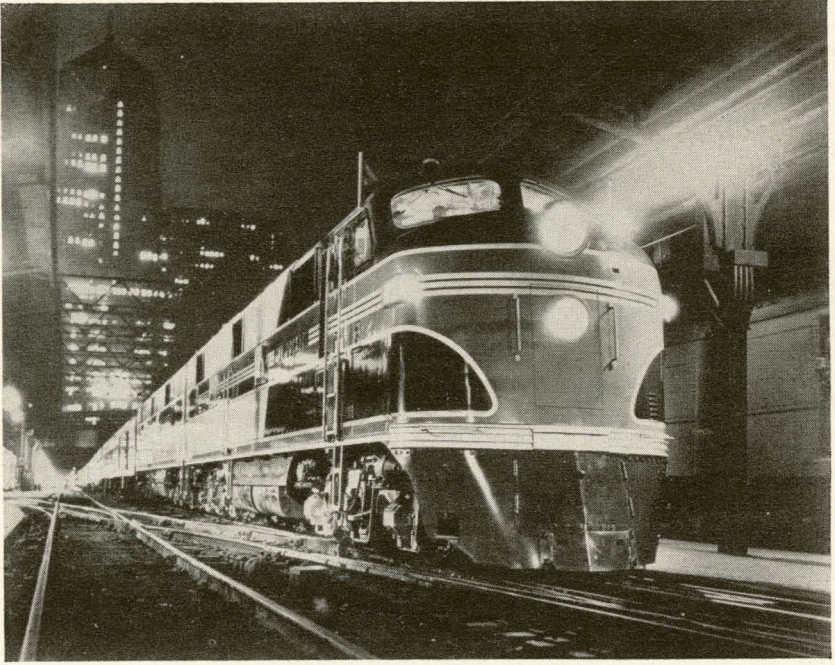
Further Standardization

THE standardization of gauge of tracks and equipment was another major accomplishment. In 1871, there were no fewer than twenty-three different railway gauges in use to a greater or lesser extent in this country. The widest of these gauges was 6 feet; the narrowest was 3 feet. (Later, a few 2-foot gauge roads were built.) Obviously, the standardization of gauge was a major undertaking, due to the fact that locomotives and cars, as well as track, had to be converted. But through joint effort and teamwork, standardization of gauge, with minor exceptions, became an accomplished fact in 1886.

Among the many other important results of joint action and joint research under Association auspices was the adoption of a Standard Code of Operating Rules by railroads throughout the country, uniform codes governing the operation of block signals and interlocking devices, and the interchange and hire of freight cars, per diem, and demurrage.

Joint studies and research also contributed greatly to the development of locomotives and cars, the air brake, the automatic coupler, automatic signals, improved communications, including train radio, and the adoption of engineering standards applying to bridges, rails, ties, and other parts of the railway track structure.





An outstanding feature of railway operations is that any shipper anywhere in the United States, Canada, Mexico, and Cuba can load a freight car for delivery at any other railway station in these four countries. This fact, which is the basis of continent-wide commerce, is largely due to the joint efforts of the railroads through the Association of American Railroads and its predecessor organizations.

The extensive research work of the Association is carried on through a Research Department and a Research Center, located in Chicago, comprised of three modern and fully-equipped laboratories. The research staff collaborates closely with all other departments and committees of the Association to insure the most effective direction of research activities and the fullest utilization and adoption of research developments into railroad practice. Research studies are also carried on in cooperation with individual railroads, railroad suppliers, universities, colleges and technological institutions.

Rail Progress

NO feature of railroading has been subjected to greater study on the part of engineers and metallurgists than the rails over which the heavy trains roll. To most people, the rail of today might appear to be the same as that of years ago. But it is heavier, stronger, more durable, and much safer.

The first railroads in this country were constructed of wooden rails upon which were fastened thin strips of iron to provide a running surface for the wheels. Iron rails, many of which were imported from England, gradually replaced wooden rails. The weight of these iron rails was about 50 to 56 pounds to the yard.

The first steel rail was rolled in this country in 1865, and in the 1870's steel came into extensive use. By the late 1890's it had almost entirely replaced iron. As weights of locomotives and cars increased and methods of rail manufacture were improved, the weight of rails increased. Today's steel rails—much superior to those of even a short generation ago—range in weight from 85 to 155 pounds per yard. The average weight of main line railroad rail is now almost 105 pounds per yard.

The length of rail has also been increased from time to time. The earliest strap-rail was 8 or 10 feet in length. By 1850, rail 18 and 20 feet in length was common. In 1920, the standard length was 33 feet. The present standard length is 39 feet, but some railroads use rails 60 to 78 feet long in special locations. In fact, some railroads are now using "continuous" rail—rail that has its joints welded together into lengths of a mile or more. The longest continuous welded rail in use in the United States in 1958 was 33,792 feet. There are many stretches of continuous rail exceeding a mile in length.



Passengers Enjoy the Spacious Comfort of the Observation Car.

Evolution of Locomotives

PROBABLY no part of the railway plant better illustrates the evolution of railroads and railroading than the locomotive. The earliest locomotives in this country weighed only a few tons each. Some of these little engines had upright boilers; others had horizontal boilers and horizontal cylinders.

Engines soon passed from the experimental to the practical stage, and the high-stacked wood-burners of the 1850's, although comparatively insignificant in size, began to resemble somewhat the steam locomotives with which most Americans are familiar. As standardization went forward, locomotives increased greatly in size and power. Improved use of fuels, greater safety, greater ease of operation, metals of greater strength—these are a few of the developments in locomotives.

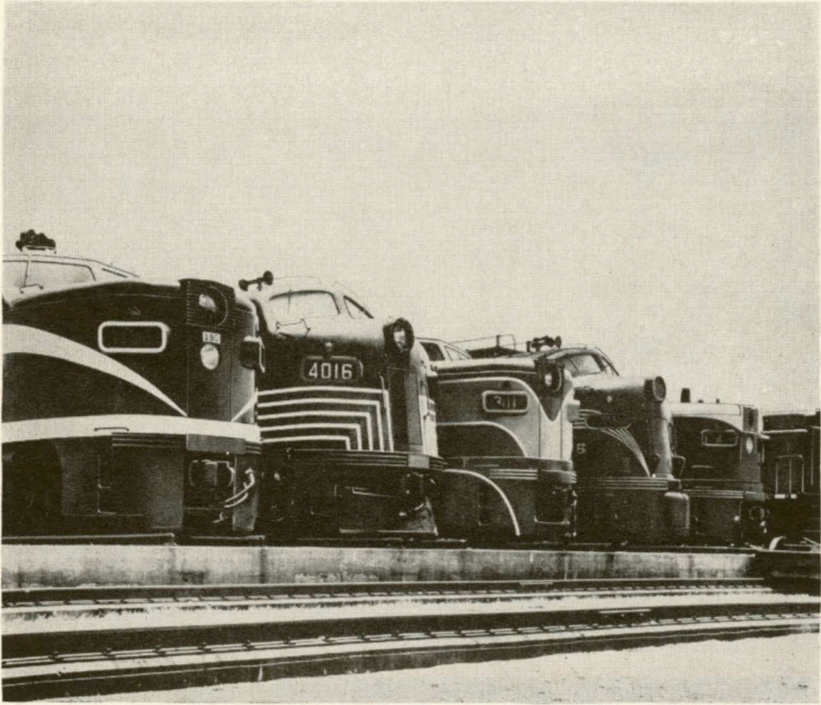
The electric locomotive made its appearance in 1895, and by 1945 more than 6,000 miles of track had been electrified.

One of the most significant developments in the railroad field in recent years has been the trend toward Dieselization of motive power. The first Diesel-electric locomotive was placed in switching service on an American railroad in October, 1925, but it was not until 1934 that Diesel-electric locomotives were first used in passenger-train service. By 1941 they were being used in long-distance freight service. The most recent use of Diesel-electrics has been in commuter passenger-train service.

At the end of World War II the railroads had in service 2,800 Diesel-electric locomotives, consisting of 3,645 units. At the end of 1957 these railroads were operating 27,186 Diesel-electric locomotive units.

In freight service, the proportion of the total traffic handled by Diesel-electric locomotives, measured in gross ton-miles of cars, contents and cabooses, increased from $\frac{1}{5}$ of 1 per cent in 1941 to 92.16 per cent in 1957. In passenger-train service, Diesel-electric locomotives handled 7.75 per cent of total car-miles in 1941. The proportion increased to 92.56 per cent in 1957. In yard service, Diesel-electric locomotives in 1941 accounted for 12.01 per cent of the total locomotive-hours performed, as compared with 95.80 per cent in 1957.

New types of locomotives now in use include the gas-turbine electric locomotive, which burns fuel oil and develops from 4500 to 8500 horsepower; the ignitron rectifier electric freight locomotive, which packs 4000 horsepower per unit; and the steam turbine coal-burning electric locomotive rated at 4500 horsepower.



Modern Motive Power Is Fast, Strong, Dependable.

Railroad engineers are studying the possibilities of a locomotive powered by atomic energy.

Passenger Car Improvements

THE first passenger cars were little more than stagecoaches mounted on flanged wheels. These were soon replaced by vehicles that looked like box cars with windows. Cars were lighted first by candles, then by oil lamps, and were heated by stoves. The earliest notable improvement in car building was the invention of an axle moving with the wheel instead of the wheel revolving on the axle. The wheels were then combined into a four-wheeled truck.

Gradually, passenger cars increased in size and comfort. Experiments with sleeping cars began as early as 1836. Stateroom cars were introduced in 1856. The first Pullman sleeping cars were placed in service in 1859 and 1865. The first dining cars were introduced in 1863, and in 1867 "hotel cars," combining sleeping and dining facilities, were placed in service.

By 1887, passengers were enjoying the comforts of steam heat and electric lights and had the security of the air brake, which replaced the hand brake. The old link-and-pin coupler was giving way to the safe and efficient automatic coupler. The built-in vestibule was invented in 1887, and the first train completely equipped with vestibules was placed in service that year. In 1903, steel-frame passenger cars were introduced, and in 1906 the first all-steel passenger coaches were placed in service, adding to the safety of train travel.

Passenger car developments in the present century include safety glass, fluorescent lighting, air conditioning, and streamlining. Reclining coach seats, roomette cars, cafe cars, lounge-parlor cars, tavern cars, coach sleepers, and glassed-in dome observation cars are features of the modern passenger train. Today, the railroads have many refinements in design which assure the greatest possible passenger comfort and safety.

Streamlined Trains

ONE of the outstanding developments of the 1930's was the introduction of streamlined passenger trains. The first successful streamliners were introduced in 1934. Such trains, constructed of alloys which are lighter and stronger than ordinary steel, are powered



Sumptuous Meals Are Served in the Dining Car.

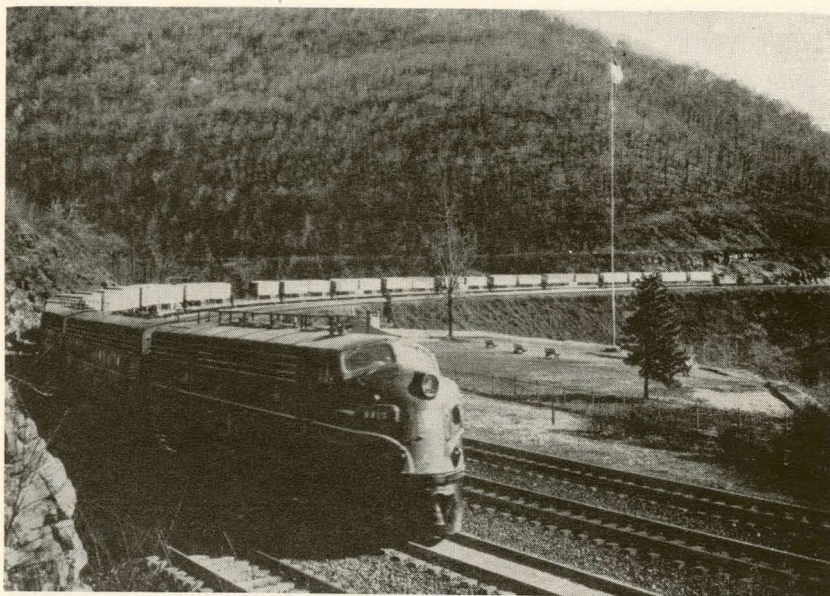


by Diesel-electric, electric and steam locomotives. The trains are designed and built to reduce air pressure or wind resistance as much as possible, and this, together with lightweight passenger cars, permits greater speed with a given amount of power.

Streamlined trains are air-conditioned to shut out dust, smoke, cinders, drafts, cold or heat, and provide clean, washed air at temperatures that assure passengers the maximum of comfort. With dust and smoke no longer a problem, the interior decorations and furnishings are done in cheerful and attractive color schemes. All-electric dining cars and dome dining cars are recent innovations.

Progress in Freight Service

MARKED progress has also been made in freight equipment and in freight train operations. The earliest freight cars were of only a few tons' capacity. Modern freight cars are capable of carrying from 40 to 80 tons each. Some specially constructed cars are capable of carrying as much as 250 tons each. Modern freight cars are equipped with improved air brakes and automatic couplers. Wooden freight cars have been replaced by all-steel cars or by cars having steel underframes and steel framework. Among the latest innovations are freight



A Trainload of "Piggy-Back" Freight Winds Through the Mountains.

cars constructed of stainless steel, aluminum, or light-weight alloys; compartment cars; aluminum container cars for small-lot shipments, cars equipped to carry highway trailers (commonly called "piggy-back" service), and cars equipped with automatically regulated refrigerator systems.

Where only two kinds of cars were once used—flat and box—modern freight equipment includes tank cars, refrigerator cars, open-top and closed-top gondola cars and hopper cars, container cars, automobile cars, furniture cars, ore cars, pulpwood cars, stock cars, poultry cars, and many other types of cars for special uses.

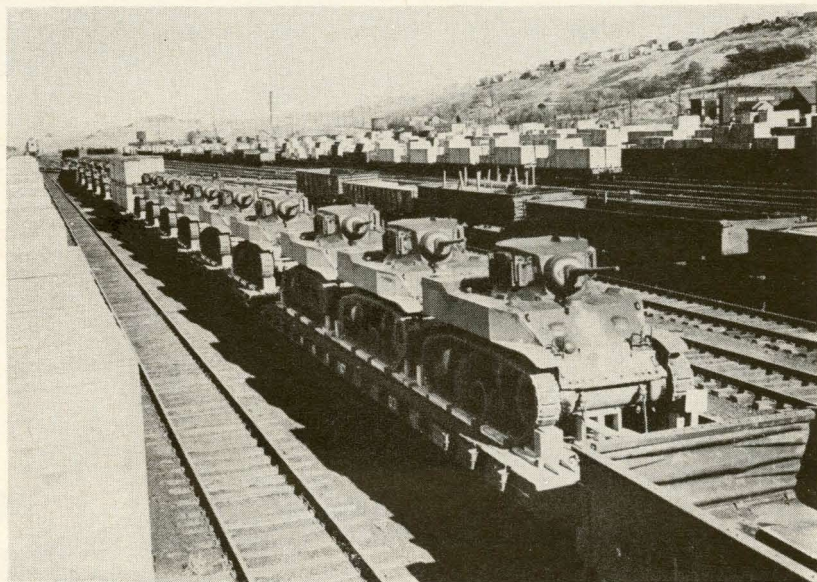
Today, we have freight cars especially adapted for the transportation of every type of shipment.

Railroads in Two Wars

RAILWAY performance in World War II was in striking contrast to that of World War I. In the first war the Federal Government took over the railroads and operated them at a loss to the taxpayers of approximately \$2,000,000 a day. In World War II, the railroads were operated by their owners, and, instead of being a heavy drain upon the public purse, they contributed more than \$3,000,000 a day in taxes to the support of the Federal Government and the war effort.

During World War II more than 97 per cent of all troops and 90 per cent of all Army and Navy equipment and supplies were transported by rail. With about one-third fewer locomotives, one-fourth fewer freight cars, and one-fourth fewer employees in World War II than they had in World War I, the railroads performed nearly double the amount of freight traffic and more than double the amount of passenger traffic performed in the first war, and they did the job without the congestion or delays which characterized operations in the first World War. Another remarkable record is that despite advances in wages, prices, and taxes, freight rates at the end of the war were at, or below, pre-war levels and passenger fares had increased but slightly. Since the war, however, with greatly increased wages and prices and with taxes far above any previous peace-time period in history, the level of freight rates, as measured by revenue per ton-mile, and the level of passenger fares, as measured by revenue per passenger-mile, have increased about 53 per cent and 62 per cent, respectively, above the 1940 level.

The railroads' success in handling the much greater volume of business during World War II was due to several factors, including technological improvements in the railway plant, careful planning in conjunction with the Government, the cooperation of shippers in the prompt loading and release of freight cars, and the loyal efforts of



Railroads are the Lifeline of the Nation.

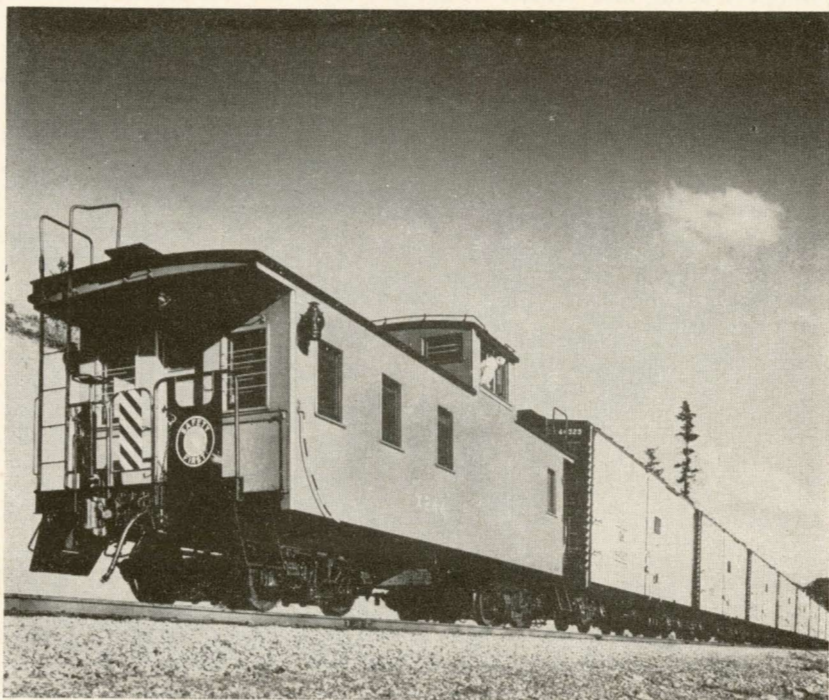
railroad employees who operated the trains and stations and maintained the tracks, locomotives, cars, and other railway facilities.

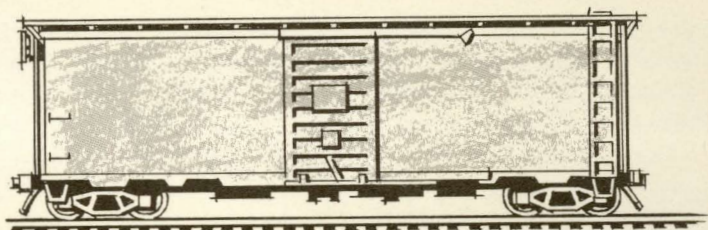
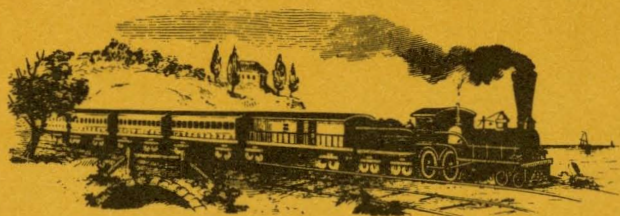
Since the end of World War II the railroads of the United States have invested more than fourteen billion dollars of new capital in additions and improvements to their properties—attesting their abiding faith in their own future and in the future of the great nation of which they are a part.

Railroad Progress Continues

RAILWAY progress in the United States has continued without interruption since pioneering days. The railroads are still experimenting, still exploring, still searching for better materials and better ways in which to do their work.

Year after year, decade after decade, these transportation agencies have grown in usefulness and in efficiency. Providing the country's basic transportation services, our privately-owned and privately-operated railroads will continue to play an increasingly important part in the economic life of the nation.





ASSOCIATION OF AMERICAN RAILROADS

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