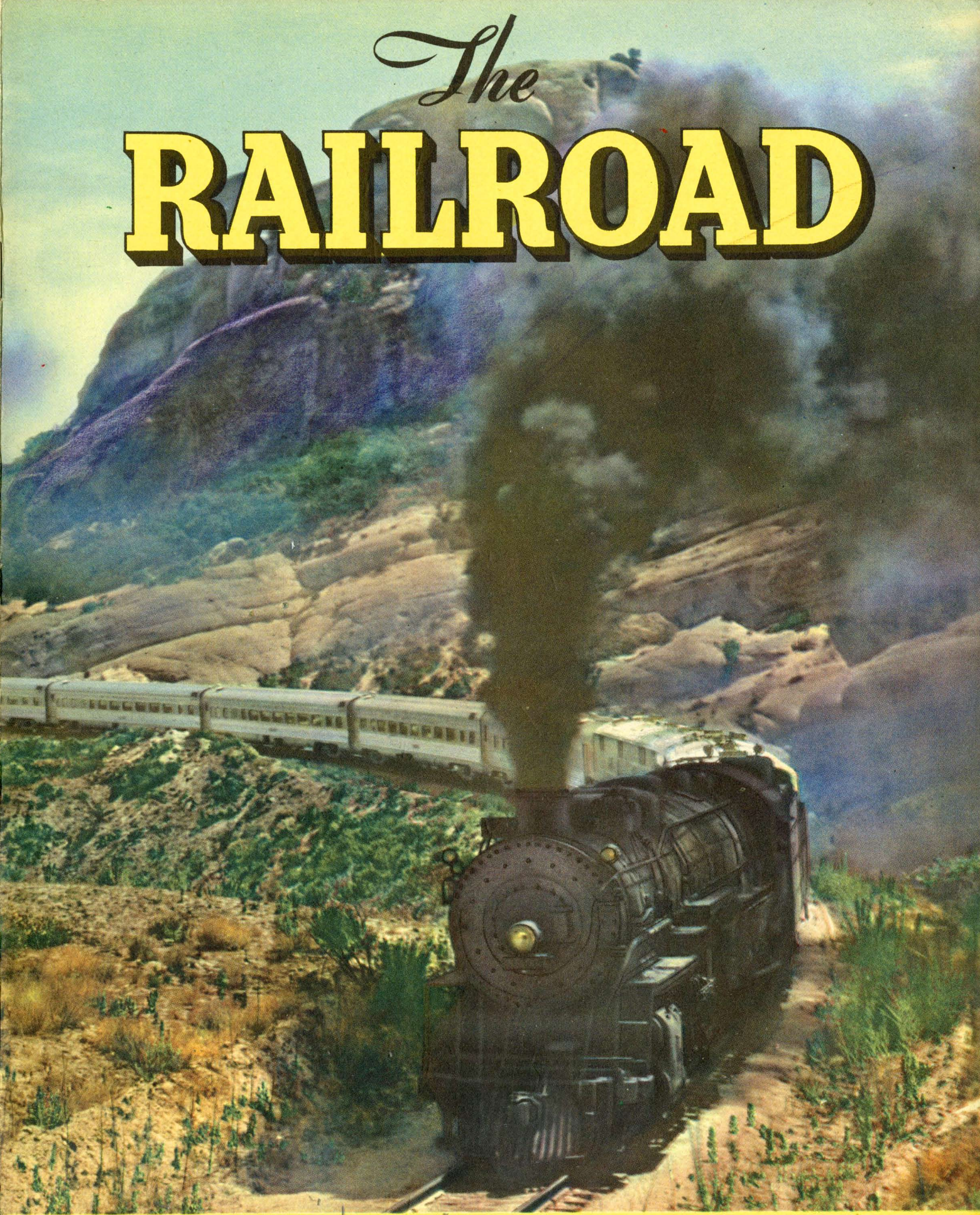
The RAILROAD



FURNISHED THROUGH THE COURTESY OF SANTA FE SYSTEM LINES

A DEDICATION

WE dedicate this booklet to the men and women who "keep 'em rolling"—to the railroad workers of America whose courage, stamina, and ingenuity enable the American railroads to serve their country so ably in war and in peace.

This is their story and the story of railroading, with its traditional spirit of enterprise and adventure. It is written to answer the thousands of requests which are received each year from teachers and students throughout the country for material on railroads that will be suitable for classroom use.

We cordially invite future correspondence, and will be pleased to furnish additional material on this vital subject.

Grateful acknowledgment is made to the editorial and art staffs of Scholastic Magazines for cooperation in preparing this book.

Lee Lyles, Assistant to the President
Santa Fe System Lines

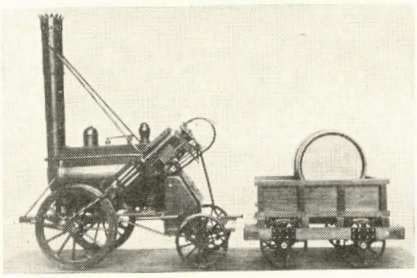
The London Traveler

THE LONDON TRAVELER is an imaginary newspaper, but the "news" in it actually happened. If it were printed today, this is how such a newspaper would look to you.

New Roads Speed Travel

ENGLAND, 1816: John MacAdam has announced the development of a new method for surfacing rough and rutted roads so that they will be smooth even in bad weather.

Mr. MacAdam states that stage coaches running over roads surfaced by his method will travel more smoothly and quickly. There will be fewer instances of axles breaking, and less delays due to bogging down in mud holes.



THE "ROCKET"

Stephenson Scores Again

ENGLAND, 1829: George Stephenson's new locomotive, the "Rocket" won first prize of 500 pounds in a contest sponsored by the Liverpool and Manchester Railway.

The "Rocket" locomotive startled all spectators by traveling at the enormous speed of 30 miles an hour!

Train Wins Race with Horse!

ENGLAND, 1825: A locomotive, built by George Stephenson for the Stockton-Darlington Line, recently won an epic 100 yard race against a horse-drawn train!

The Stockton-Darlington Line, which opened this year, is the first public railway on which a locomotive does the hauling.

The first train to be pulled by this amazing "iron horse" consisted of 22 wagons filled with passengers and 12 wagons loaded with coal and flour, a total weight of about 90 tons. Yet, in spite of this immense load, the train traveled a distance of about nine miles in 65 minutes!

Many people believe that some day steam-engine drawn trains will run the length and breadth of England. Other people point out that steam-drawn trains will never replace horses.

It was not until 1814, when George Stephenson built his first engine, that the great value of the locomotive was fully appreciated.

Mr. Stephenson possesses remarkable ability, both as an engineer and as an inventor. He early became interested in the use of steam engines for propelling carriages.

The first actual steam carriage of which there is record, was made in 1769 by a French officer, Captain Nicholas Cugnot. It was invented because the French army needed an easy method to haul its guns. The machine built by Cugnot traveled about three miles an hour and had to be refueled after 15 miles. On its second test it overturned and was rejected as a failure.

In 1802, an Englishman named Richard Trevithick constructed a road locomotive which was able to carry passengers. Two years later he mounted the steam engine on a wagon, using it to pull cars on rails. He was able to haul ten tons of coal at a speed of five miles an hour. But the locomotive ruined the roadbed.

Stephenson, like Trevithick, also mounted a steam engine on a wagon placed on rails. As it rattled along the track, the roar and hiss of escaping steam scared horses and men, creating near panic. To overcome this noise, Stephenson forced the steam into the stack of his engine. In so doing, he found out that the steam made a draft and caused the fire under the boiler to grow hotter. The result was that more steam was generated, giving the locomotive more speed and power.

When interviewed, Mr. Stephenson said, "In the future, all steam engines will make use of this important principle."

Railway Boom Foreseen

ENGLAND, 1830: Members of the House of Commons predict that steam railways will soon grow in number, and that many beneficial changes will result.

The opening of railroads has already resulted in lowering the price of coal and the cost of carrying merchandise from factories to market.

A Radio Play for Classroom Use

SOUND: *Train whistle, faint in distance. Fade in swift roar of train, shrill blasts of whistle. Sustain in full, then fade out on clicking wheels and faint, hollow blasts.*

ANNOUNCER: Santa Fe Lines present . . . "The Story of America's Railroads."

MUSIC: *Burst; fade into:*

SOUND: *A medley: rasp of saw, bite of axe, creak of wheels, threshing hoofs and grunting men.*

NARRATOR: Hear that? That's America—a hundred and sixteen years ago . . . America—a raw-boned, hamfisted giant with arms like crowbars and steel-knotted thighs . . . America—a great big gangling giant with a cocky grin and a booming laugh, standing astride a continent . . . That's America hefting his shoulders, flexing his muscles, carving a nation out of towering forests and sandy wastes, roaring rivers and gentle streams, mountain crags and rolling valleys . . . That's America building a nation.

MUSIC: *Surge, then fade softly into:*

SOUND: *Hammering an anvil.*

Trevithick's Locomotive, 1802

SOUND: *Hiss of steam, rasping creak of wheels.*

NARRATOR: *That's* a locomotive—the first locomotive ever seen in the United States of America.

SOUND: *Train in full, then fade slowly behind.*

NARRATOR: Oh, it wasn't much of a locomotive compared to the one that pulls the Santa Fe *Chief*—or to other streamlined, super-powered engines we have today. It huffed and puffed and groaned so heavily with its own weight—eight tons—that it was declared unsafe for the frail rails and trestles of the times. (*Fading*) But on a hot August day in 1829 it wrote a new chapter in American history . . .

SOUND: *Fade in hiss of steam, crowd effect.*

ALLEN (*Calls*): Stand back! Clear the tracks!

VOICE I (*Drawls*): Take it easy, sonny. You ain't a-goin' nowheres.

VOICE 2: Heck, no! Thet newfangled critter ain't got the strength to pull its own weight!

SOUND: *Laughter ad lib. Great hissing of steam, clanging of bells—then the slow creak of wheels.*

VOICE I (*Awed*): Glory be! She's a-movin'!

SOUND: *Horse whinnies, threshes hoofs. Triumphant toot of whistle as engine gathers speed.*

NARRATOR: Yes, there were a great many skeptics when the *Stourbridge Lion* was brought over from England for a trial run. But driven by Horatio Allen, a young American engineer, it ran for two miles without breaking down or leaving the tracks . . . On that bright summer day a hundred and sixteen years ago—when a pint-sized, pickle-shaped engine gathered steam and started to roll before a

RAILROADS AND AMERICA

NARRATOR: That's a blacksmith welding iron in Indiana.

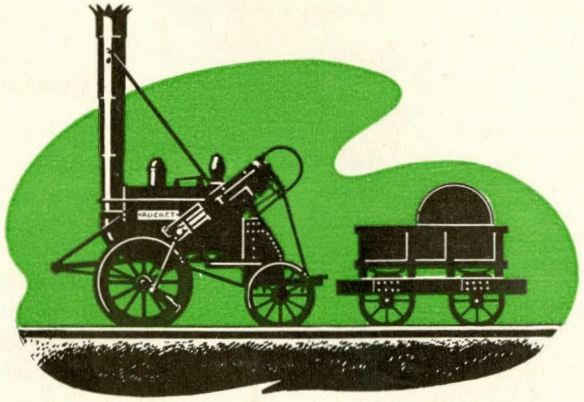
SOUND: *Crack of axes and falling trees.*

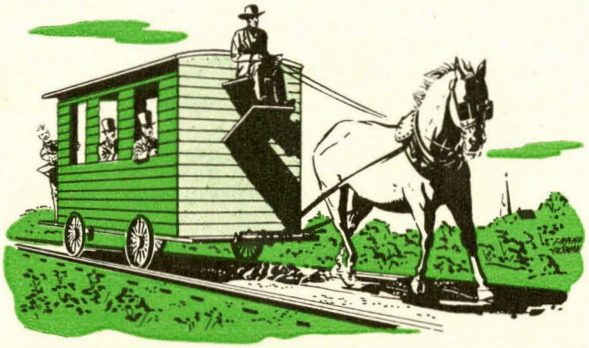
NARRATOR (*Building*): Frontiersmen hacking a road through Tennessee.

SOUND: *Paddle-wheels, deep-throated whistle.*

NARRATOR: A steamboat carrying cotton from the Mississippi levees.

Stephenson's "Rocket," 1829





Horse Car, 1829

jeering, gaping crowd—the story of America's railroads really began . . . a story soon to be heard 'round the land. For the story of our railroads is an important, exciting chapter in the story of America itself. They grew up side by side. . . .

MUSIC: *Burst, then sneak behind following.*

NARRATOR: The success of the *Stourbridge Lion* convinced many Americans that the steam engine was here to stay. So—a little more than a year later—Peter Cooper built the *Tom Thumb,* the first locomotive constructed in the United States.

ADDIE (*Sputtering*): You—you imbecile! Starting a train so's to knock a body off her feet! I'll report you—that's what I'll do! I'll—

CONDUCTOR (*Hastily*): Ain't my fault, lady. It's them danged chains connectin' the cars. Every time we start up, the coaches jest naturally take up the slack between 'em 'n crash into one 'nother.

ADDIE (*Unmollified*): Humph!

SOUND: *Great hiss of steam, belch of boiler.*

ADDIE (*Shrieks*): Oh!

CONDUCTOR (*Alarmed*): What's wrong now, ma'am?

ADDIE: My hat! It's on fire!

CONDUCTOR: Jehosaphat! It's them cinders from the engine! (*Beats at fire.*)

ADDIE (*Wails*): My hat! My brand-new hat! It's ruined! (*Fading*) Ruined!

NARRATOR (*Fades in*): Yes, America's early railroads were often a comedy of errors. But improvements were rapid and far-reaching. The three-link chains which jerked the *De Witt Clinton's* passengers out of their seats gave way to a straight iron bar—then to a single link, held in place with great iron pins—and finally, in the 'nineties, to the automatic coupler. In 1868, George Westinghouse became a

THEY GREW UP SIDE BY SIDE

SOUND: *Sneak in whistling of blower, hissing steam, rasp of wheels.*

NARRATOR: The *Tom Thumb* wasn't much bigger than the handcars workmen use on the tracks today, and its boiler was about the size of a kitchen boiler on an ordinary coal stove. Its spirit was willing, but it was too small to be practical—and shortly after it appeared, the first American-built locomotive to run in regular service was born. It was called *The Best Friend of Charleston. . . .*

SOUND: *Toots of train whistle.*

NARRATOR: After seven months, a radical new locomotive took to the rails. It was the *De Witt Clinton,* named after the governor of New York. Like the others, it burned wood—but it boasted a newfangled horizontal boiler instead of the old bottle shape. And its coaches were the last word in passenger comfort—stagecoaches with rail-fitting wheels.

CONDUCTOR: All aboard! All-l a-boardd!

SOUND: *Blast of horn. Excited voices ad lib. Great hissing of steam and churning of wheels, then a sudden jerk—squeals, shouts, and sprawling passengers. Train gathers speed.*

ADDIE (*Gasps*): Oh! . . . Oh!

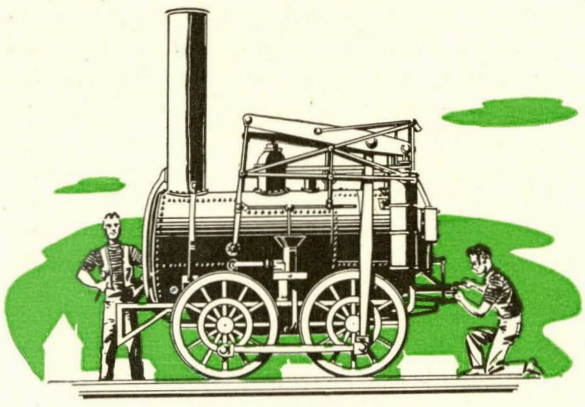
CONDUCTOR (*Fading in*): Can I help you up, ma'am? (*Effort*) I'm the conductor.

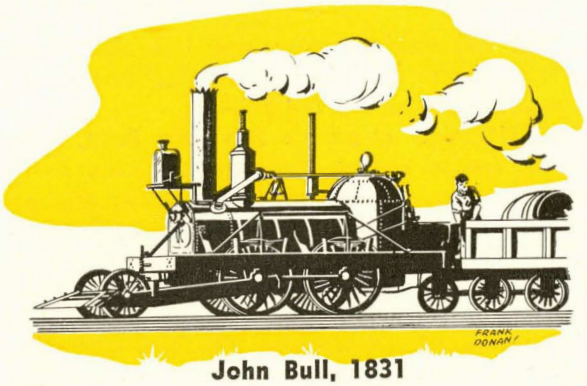
hero to passengers and trainmen alike by designing the air brake. Before that time, trains were mostly braked by hand—a process which resulted in jolting, shuddering stops and shattered nerves.

SOUND: *Sneak in effect of train air-braking.*

NARRATOR: The air brake, by using compressed air to cushion the shock, changed all that . . . An even greater blessing was the appearance of the Pullman car. (*Fading*) The idea for it was born on a night in 1858, when George S. Pullman irritably

The Stourbridge Lion, 1829





John Bull, 1831

tossed and turned on one of the uncomfortable bunks supplied by the day coaches of the time . . .

SOUND: *Distant chug of engine, rattle of wheels, snorts and snores of sleeping passengers.*

PULLMAN *(Mumbles)*: Confounded cot . . . Can't sleep . . . Toss . . . Twist . . .

CONDUCTOR *(Shakes him)*: Mr. Pullman . . . Mr. Pullman—

PULLMAN *(Awake)*: Eh? What?

CONDUCTOR: You were talking to yourself, sir. I'm the conductor. Is there anything you want?

PULLMAN *(Snappishly)*: Yes—a bed! I haven't slept a wink all night!

CONDUCTOR: I'm sorry, sir. That bunk is the best we have.

PULLMAN: Well, your best isn't good enough, young man. When I travel, I want comfort—a spring mattress, a reading lamp, a washroom—

CONDUCTOR: Gosh, Mr. Pullman. You must want a regular sleeping car!

PULLMAN *(Struck)*: A sleeping car! By Harry, that's it exactly!—A sleeping car on wheels. I'll manufacture it.

MUSIC: *Burst; sustain behind following.*

NARRATOR: George Pullman was as good as his word. He bought a day coach and remodeled it into a sleeper. [It didn't fulfill his dreams, but it was a good beginning. The car boasted a wood-burning stove at each end and candles to read by. There was an open washroom, with tin basin and water tank—and folding upper berths that were the first of their kind.] Crude as it was, the first Pullman was the most luxurious coach then on the rails.

MUSIC: *Surge to a finish.*

NARRATOR: Improved trains called for improved tracks. Some of the first railways used cut stone fitted together for rails—others used timber. But soon, iron was drafted to carry the growing weight and increased traffic of the trains.

SOUND: *Sneak in hammering of iron.*

NARRATOR: The first iron rails were heavy cast iron bars. They were only three or four feet long. England was making rolled iron rails, which were stronger, and in 1844 America followed suit.

SOUND: *Sneak in blast furnaces.*

NARRATOR: These rails, shaped like a T, became the standard carrier for America's growing "iron horse." Then, in 1862, the world heard of Bessemer steel . . .

SOUND: *Blast furnaces in full.*

NARRATOR: Bessemer steel revolutionized rails. Henry Bessemer's process forged steel rails that were cheaper than iron, carried more than twice its weight, and lasted five times as long. They were the magic carpet which paved the way for heavier, more powerful locomotives and longer trains. They were the railroads' new gateway to the North, South, East, and West. And the trains began to roll.

MUSIC: *Burst, then fade into:*

SOUND: *Chugging of trains, occasional toot of whistle, clang of bell. Continue behind following.*

NARRATOR: They chugged from the cotton fields of Georgia to the tidewater towns of Massachusetts—from New York to the placid plains of Ohio. They labored up mountain grades in Pennsylvania—hurtled down steep slopes in West Virginia . . .

SOUND: *Sneak in effect of train on bridge.*

NARRATOR: Ahead of them, men worked feverishly to build bridges . . .

SOUND: *Sneak in train on trestle.*

NARRATOR: and trestles . . .

SOUND: *Sneak in train entering tunnel.*

NARRATOR: and tunnels . . .

SOUND: *Sustain briefly hollow echo of train in tunnel. Then as it exits, fade into medley of axes felling trees, spikes being driven into ties, etc.*

NARRATOR: And ahead of them, too, spun a web of shiny steel rails—pushing, shoving, thrusting across America. America's song—the screech and creak of wagon wheels on the open road—now became the rhythm of the railroads.

MUSIC: *Burst; then fade behind following:*

NARRATOR: Cities sprang up along the steel rails . . . Youngstown, Madison, Des Moines, Chicago.

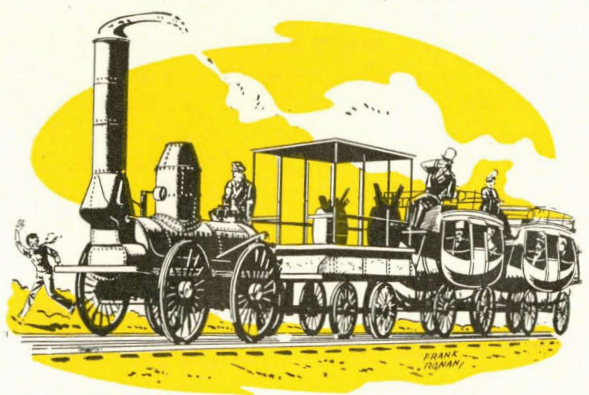
MUSIC: *Old Chicago theme music.*

NARRATOR: Chicago . . . In 1848, the Windy City was a sprawling, brawling frontier town built on mud flats. There wasn't a single railroad connecting it to the rest of America. But as Chicago grew, it became the hub of a great railroad wheel . . .

SOUND: *Sneak in montage of railroad effects.*

NARRATOR: One spoke in the wheel stretched southward toward Missouri. Two spokes slid across

The De Witt Clinton, 1831



to the mud-banks of the Mississippi. Then, west of Chicago the song of the rails was heard . . .

SOUND: *Distant blast of train whistle, hum of locomotive. Sustain briefly in full, then fade into:*

MUSIC: *Oh, Susannah—a few bars, then fade.*

NARRATOR: It was heard all the way west to Kansas, to Topeka—crossroads of the California and Santa Fe Trails. Its music faintly filled the air of a bright November day in 1868—when a handful of curious citizens of Topeka saw the first shovelful of earth turned for the grading of a new railroad named *Atchison, Topeka, and Santa Fe* . . .

SOUND: *Clang of shovel on rock. Cheers ad lib.*

NARRATOR: Its rhythm crept into the speech of Cyrus K. Holliday, organizer of the new railroad, and made his words sing . . .

HOLLIDAY: I predict that you who are present will live to see this railroad completed to Santa Fe.

SOUND: *Laughter ad lib. Sustain briefly in full, then fade behind following.*

NARRATOR: Laughter greeted the railroad builder's prediction. Santa Fe was almost seven hundred miles away—a tortuous, winding trail across wild prairies, rushing rivers, and the Rocky Mountains. But Cyrus Holliday didn't hear the crowd's laughter. His ears were listening to the far-off song of the rails—his eyes were seeing endless trains spanning the great American Southwest . . .

MUSIC: *Sneak in montage of rhythmic railroad effects, quickening and rising to a crescendo.*

NARRATOR: And eight months later Holliday's dream slowly but surely started to come true . . .

SOUND: *Hammering of steel and ties, grunting men. Continue behind following.*

NARRATOR: Westward, big-muscled, soft-spoken railroad gangs laid tracks, installed switches, built depots and stations, put up telegraph poles and strung the wires. The work was hard—the way was dangerous. Along the route, Indians lay in ambush.

SOUND: *Thud of hoofs, war whoops, gun shots in fast and out.*

NARRATOR: And stampeding herds of buffalo crumpled the telegraph poles like toothpicks . . .

SOUND: *Stampeding buffalo, cracking telegraph poles in fast and out.*

NARRATOR: But the march of the railroadmen could not be blocked. The twin ribbons of steel crisscrossing the land were the path of progress.

MUSIC: *Burst, then fade behind following.*

NARRATOR: Mile after mile slid under the shiny steel rails. Town after town was joined as the great new artery went pulsing westward . . . Wakarusa . . . Carbondale . . . Newton . . . Dodge City . . . La Junta . . . Las Vegas. These were the names on the land . . . Indian names . . . Pioneer names . . . Proud American names . . . New towns sprang from the sagebrush. Old towns boomed into prosperous cities . . . It was a time for greatness—and of easy riches and quick gun play . . . (*Fading*) Outlaws prowled the land, waylaid the trains . . .

SOUND: *Toot of whistle, chug of locomotive—then hoofbeats in fast, several gun shots. Train brakes to a stop. Feet on steps, door bursts open.*

BILLY (*Slow drawl*): Get them sacks together, mistuh. Fast.

VOICE 1 (*Back*): I'll see you six feet under first! These pouches contain United States mail!

BILLY (*Quietly*): Hand 'em over.

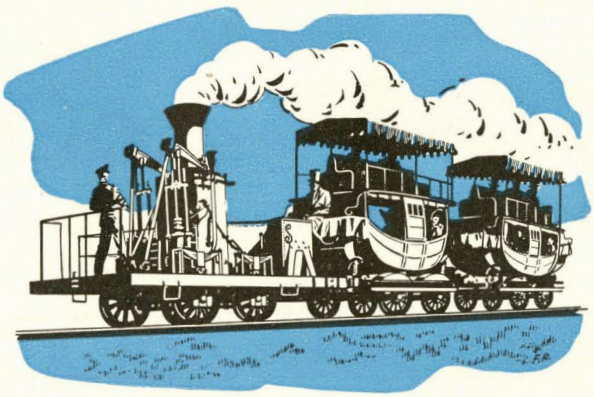
VOICE 1: Why, you young whippersnapper—

SOUND: *Shot on mike.*

VOICE 2 (*Back, Agitated*): Mike—give 'em to him—quick! That's Billy the Kid!

MUSIC: *Burst, then fade behind following.*

NARRATOR: But neither outlaws nor other obstacles could halt the on-rushing tide of trains. On February 9, 1880, the rails reached Santa Fe . . .



The Atlantic, 1832

SOUND: *Cheers of crowd.*

MUSIC: *A Hot Time in the Old Town Tonight.*

NARRATOR: It meant the end for the old Santa Fe Trail. No more would the bull teams and mule wagons make the long trek back to Missouri. But for the *Atchison, Topeka, and Santa Fe Railway,* it was only the beginning. Its rails thrust across the badlands toward the Pacific—to San Diego and Los Angeles, and later through the San Joaquin Valley to San Francisco. New arteries bridged the Missouri and Mississippi Rivers and drove eastward into Chicago. Other lines pushed south through Oklahoma and Texas to the Gulf of Mexico. Born of a dream, the *Atchison, Topeka, and Santa Fe* became a throbbing reality.

MUSIC: *Burst, then fade behind following.*

NARRATOR: The story of America's railroads is the story of America's growth. As the railroads grew, the country grew. Exile, wilderness, loneliness, homesickness seemed to ebb away as America listened to the song of the rails . . .

SOUND: *Sneak in hum of modern Diesel-electric powered streamliner.*

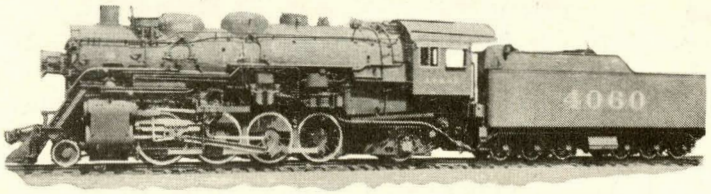
NARRATOR: Through the magic of the railroads, America became united—one nation—one people—one future.

SOUND: *Streamliner in full. Sustain for a moment, then fade into:*

MUSIC: *Surge to finish.*

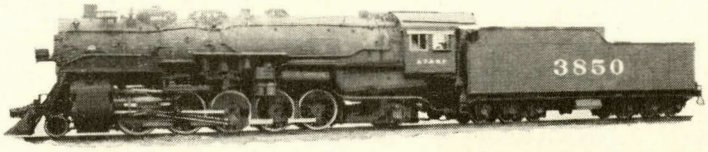
Can You Name Them?

STEAM LOCOMOTIVES are identified by the way their wheels are arranged. For example, a Mountain type locomotive has two pairs (4) of small wheels in front, four pairs (8) of drivers, and two pairs (4) of small wheels in the rear. Since from the side, its wheels look like this ooOOOOoo, it is called a 4-8-4.



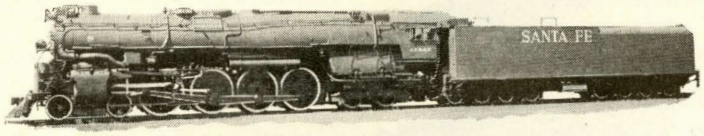
Mikado type—for heavy freight service.

2-8-2



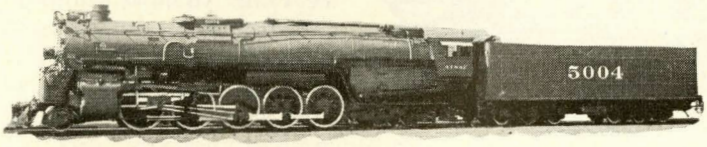
Santa Fe type—for mountain service.

2-10-2



Northern type—new high speed steam engine.

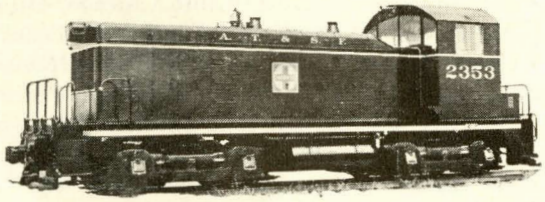
4-8-4



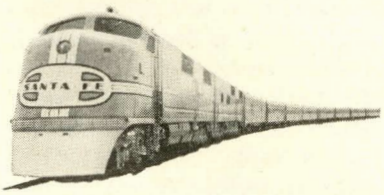
Texas type—heavy duty freight locomotive.

2-10-4

DIESEL LOCOMOTIVES are equipped with oil-burning engines which, in turn, generate electric current to supply power. Diesels cannot be identified by wheel arrangement, as *their wheels are the same size.* This is because there are no driving wheels in a Diesel. Power is applied to all wheels at once by driving axles.



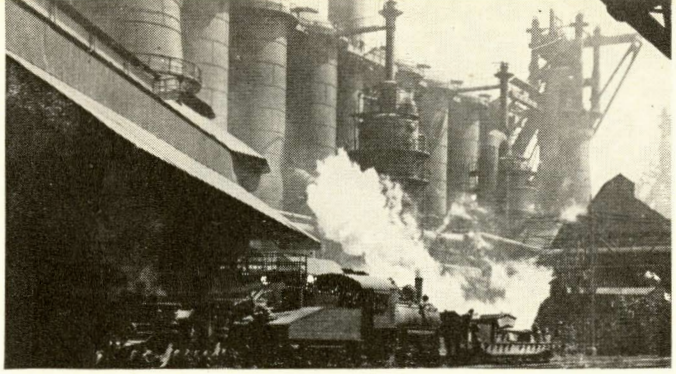
This Diesel switcher hauls cars into position.



Passengers can relax and enjoy every comfort on these sleek Diesel-electric streamliners.

A 5400-horsepower Diesel-electric freight locomotive (see photo) is 194 feet long and tips the scales at 463 tons. It carries the immense quantity of 4800 gallons of fuel oil, enough to haul a heavy freight train a distance of 500 miles without stopping for fuel.

What the Railroads Buy



Steel! To make rails, cars, turntables, tools.

HAVE you ever watched your mother fill out a shopping list? There are so many things she must remember to buy. Dad also has his worries, keeping track of the bills, and seeing that each one is paid on time.

Like your family, the American railroads "keep house." Railroads buy huge quantities of almost everything produced in America—a shopping list of more than 70,000 separate items. In 1944, railroad purchases of materials and supplies, from paper clips to locomotives, cost the staggering sum of $1,610,529,000. In the same year purchases of equipment amounted to more than 328 million dollars.

How would you like to shop for one of America's largest and steadiest customers, the railroads?

Let's start with food. In a single year, 1944, the railroads served 100 million meals. So, you will need to buy about sixty million pounds of choice meats, forty million pounds of potatoes, 95 million dozen eggs, seven and a half million pounds of butter, and whole mountains of ice cream.

In 1944, the "grocery bill" for American railroads amounted to more than 56 million dollars. Yet food is only a small part of what the railroads buy each year.

Railroads Good Customers

In normal years, railroads purchase 23 per cent of all the bituminous coal mined in the U. S.; 19 per cent of American fuel oil production; 16 per cent of all the timber cut in our country; and 17 per cent of the total iron and steel output of the United States.

Fuel alone cost the railroads more than 585 million dollars in 1944. The same year, American railroads spent more than 526 million dollars for iron and steel products.

Thousands of companies in all parts of our country, as well as their thousands of employees, benefit from the immense volume of railroad purchases. Things which the railroads buy include glass, drugs, chemicals and painter's supplies, lubricating oils and grease, rubber and leather goods, electrical materials, cement, ballast and a thousand-and-one other items. Each year, more than 730 tons of pins and paper clips are used by the railroads. In a single year, more than twenty million dollars is spent for stationery and printing.

Since 1926, the railroads have spent more than eight billion dollars for improvements, including more powerful locomotives, larger and stronger cars, additional track and ballast, and devices that make possible heavier, longer and faster trains. To increase speed and improve safety, railroads have spent many millions of dollars to strengthen track and bridge structures, and to reduce grades and curves.

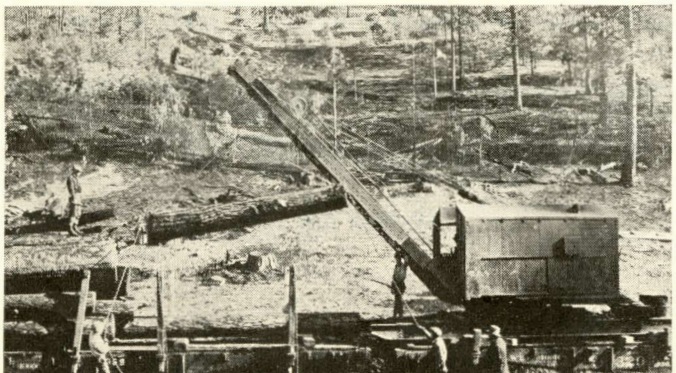
Railroads Supply Many Jobs

In addition to the goods they purchase, the railroads gave employment to an army of more than 1,413,000 men and women in 1944. American railroad wages are the highest in the world. In 1944, the railroads' payroll amounted to more than 3½ billion dollars.

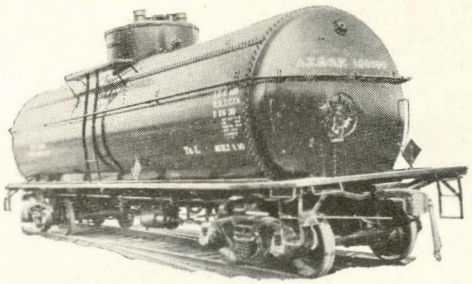
Railroads are good customers of the communities they serve and good citizens, too. Like all good citizens, railroads pay their taxes. In the war year of 1944, American railroads paid more than five million dollars a day in Federal, state and local taxes.

A large proportion of all railway taxes go to support the public schools. This money is sufficient to pay for the education of approximately 1,300,000 public school students each year. It also helps to maintain hospitals, libraries, and other institutions which make life better for all of us.

Timber! It's used for ties, bridges, stations.



Coal! An engine consumes a ton each nine miles.



16,000-gallon tank car.

Combination double deck stock car.

Fan equipped refrigerator car.

Steel box car.

A PRIMER ON FREIGHT

EACH type of freight car shown on this page is used for a different purpose.

Box cars are used to transport automobiles, grain, canned foods, package shipments, crates of machinery, and other commodities which must be fully protected from the weather, injury, or theft.

Refrigerator cars transport huge quantities of citrus fruits, fresh fruits and vegetables, dairy products, meat and fish. These cars keep food cold so that it will not spoil on its way to market.

Flat cars are used to transport heavy machinery, steel, lumber, and military equipment, such as tanks and guns.

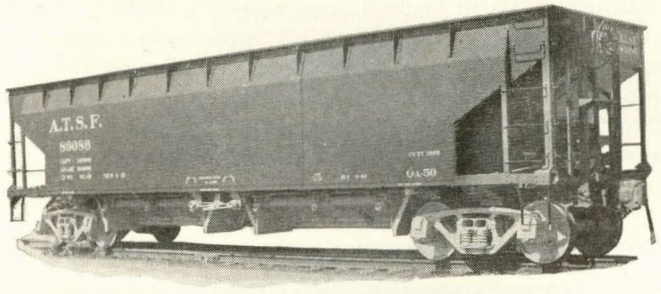
Gondola cars carry cargo which would roll off flat cars—cargo such as coal, lengths of pipe, and cordwood.

Open-top hopper cars, which are deeper, haul freight such as coal and coke, sand, gravel, and iron ore. Like gondola and flat cars, they haul cargo which does not need protection from rain, heat, or cold. Covered hopper cars, which carry products such as cement and phosphate rock, offer the full protection these products must have from the weather.

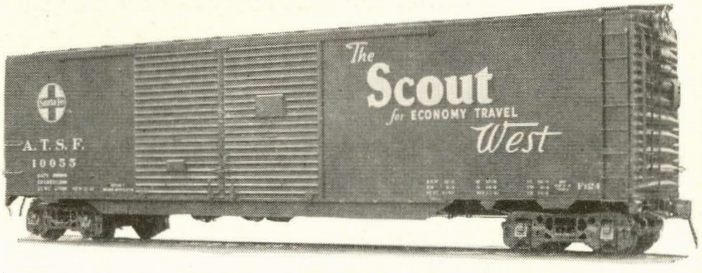
Stock cars carry livestock like cattle and calves. There are double-decked stock cars (see photo) for carrying hogs and sheep, each on a different level. Some stock cars have wire netting on their sides, and are used to transport poultry.

Tank cars carry liquids, such as oil, gasoline, alcohol, and molasses. Special glass-lined tank cars are often used to transport milk in large quantities.

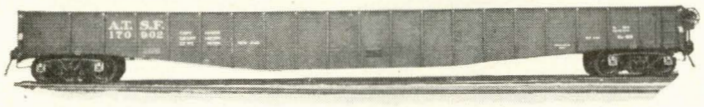
Railroads also own special-purpose cars, such as an express car which can be coupled to either a passenger or a freight train.



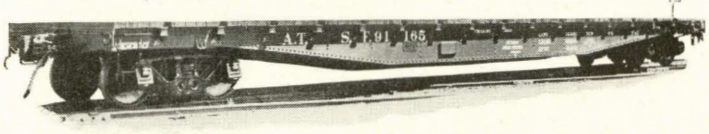
Open hopper car.



Combination passenger and freight train express car.



65-foot mill type gondola car.



60-foot flat car.

RAILROADS DELIVER THE GOODS

INDUSTRY frequently has its pulse taken by men interested in the business health of our nation. Such men often use railroad freight transportation as an index to our industrial growth or decline.

When business, commerce, and industry prosper, the flow of goods quickly traces a rising line on the graph of railroad transportation.

During wartime, these same figures are a graph of America's gathering might.

A ton mile is one such measurement. A ton mile is the service performed in carrying one ton for one mile. In 1944, the railroads handled more than 730 billion ton miles of freight, nearly twice as much as they handled in 1918.

Behind these figures was a day-after-day job as dramatic as a battle. It was a battle fought by railroad men, spurred on by our nation's need.

But even in peace there are enemies, mountains to scale, deserts to conquer, heat and cold, fog and storm. These enemies are always beaten by the railroads. The freight always goes through.

How is it done?

Let's begin with a freight car, perhaps one of the types shown on the opposite page. Empty now, it will hold as much as 50 tons of freight. American railroads own more than 1,780,000 freight-carrying cars.

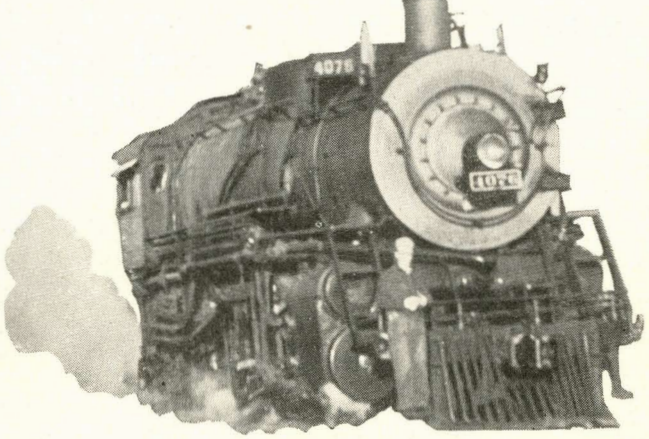
Loading the Freight

Perhaps the car is loaded at the freight depot in a terminal, district or division point. Here packages, and less-than-carload freight are accepted for shipment.

Or the freight car may be loaded at the very door of the company which is shipping the goods. Oil in tank cars, cement in covered hopper cars, heavy machinery on flat cars, are often loaded this way.

The railroad provides special tracks for industrial plants which receive and ship large amounts of raw materials, manufactured goods, or foodstuffs. In many cases, it will supply specially assigned switching locomotives and crews to do the job.

Back in the freight yards, the cars are classified, and made up into trains. Our freight trains may be going all the way from Chicago, Illinois to Los Angeles, California. Some of the cars may contain freight going in this direction—others may be empty



Freight train puffs into the yards after over-night run.

cars. Some cars will go all the way, some are bound for destinations along the route.

Whenever possible, carloads for distant points leave the yards in solid trains. This eliminates delays caused by "cutting out" cars at stations along the way. Shipments to nearby points are moved in local trains.

By the time a train has been made up and coupled together, a locomotive has been made "ready to roll" at the roundhouse.

Railroads must own many locomotives of different types. The number of cars to be moved in one train depends on how much the locomotive can haul. Each locomotive is given a tonnage rating.

Since our train has many cars and is bound for a distant point, it is assigned a large locomotive with a high rating. But on some branch lines, where the roadbed is not able to bear such loads, smaller locomotives will be used.

In mountainous regions, where grades are quite steep, helper locomotives aid in pulling and pushing trains over their grades. Diesel locomotives are often used in mountainous and desert territories, as well as on other parts of the railroad.

Yardmaster Makes Up Trains

The yardmaster is responsible for making up trains. Under his guidance, yard crews place empty cars and pick up cars when loaded. At large interchange points, the yardmaster assigns switching crews to haul loaded and empty cars between the yards of their own railroad and those of another.

Freight cars are great wanderers. A Santa Fe freight car, loaded in San Francisco and bound for New York, may pass over several different railroad systems. Even after it is unloaded in New York, it can be used by another railroad, and sent elsewhere. It may be months before the freight car is returned to the Santa Fe, during which time it may journey in all directions.

Railroads pay a small fee per diem (by the day) for the use of another railroad's freight cars. This practice explains why you often see a train made up of cars owned by several different railroads.

While our train was being made up, the yardmaster called the train and engine crews. Usually a train crew consists of a locomotive engineer, a fireman, a conductor, and two brakemen. Each crew is assigned to the handling of trains between specific district or division points.

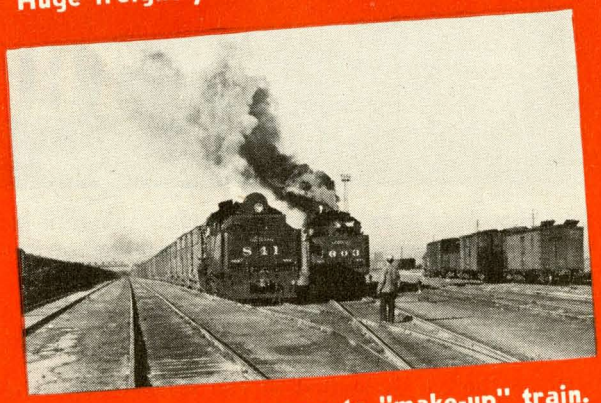
Reporting For Duty

The engine crew and one brakeman go to the roundhouse and take the locomotive to the yard where it is coupled to the train.

Meanwhile, the conductor and rear brakeman have reported for duty at the yardmaster's office. Here they receive lists of the train, including the numbers of all cars. The conductor is given a waybill for each car to be handled on his train. A waybill identifies

At the loading ramp, the freight is packed.

Huge freight yard where cars are classified.



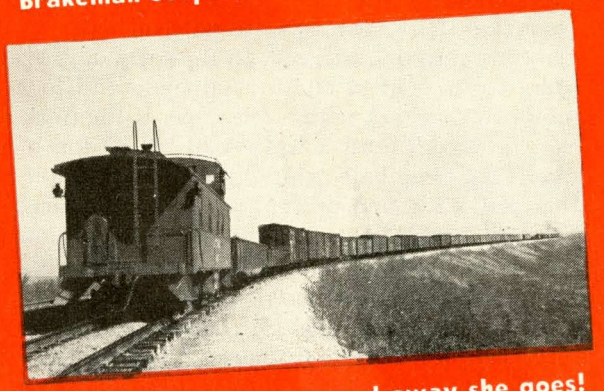
Switch engines sort cars to "make-up" train.

Train dispatcher assigns an engine for trip.

Engine moves out of roundhouse on turntable.

Locomotive tender is fed water and fuel oil.

Brakeman couples locomotive to freight train.



Caboose brings up rear, and away she goes!

the property loaded in a car and travels with it from one station to another.

The conductor is also given a "consist" which tells him the order in which the cars should go, as well as the contents, weight and destination. These "consists" are sent ahead by teletype machines to the next terminal, several hours before the train is due to arrive. This is done so that the yardmaster at the terminal will know what switching if any must be done there.

These teletype "consists" are also forwarded to freight agents at the destination. They notify the concerns receiving the freight exactly when they may expect their shipments to arrive.

Before the train is permitted to highball, air brake inspectors test the brakes. Car inspectors go over every car carefully. Oilers lubricate the axles and journal bearings to prevent "hot boxes."

A hot box occurs when a bearing becomes overheated, causing the oil packing around it to smoulder and smoke. Trainmen are always on the lookout for this tell-tale sign of bearing trouble.

After the conductor has checked the accuracy of his watch, he receives two copies of the train orders. He delivers one copy to the locomotive engineer, who shares the responsibility for carrying out these orders.

Ready to Roll

When the engineer and conductor obtain a "clearance" from the air brake inspectors, the train may depart. The engineer and fireman climb into the cab, and are soon busy at throttle and gauges. The head brakeman also rides the locomotive, so that he can quickly open switches and sidings.

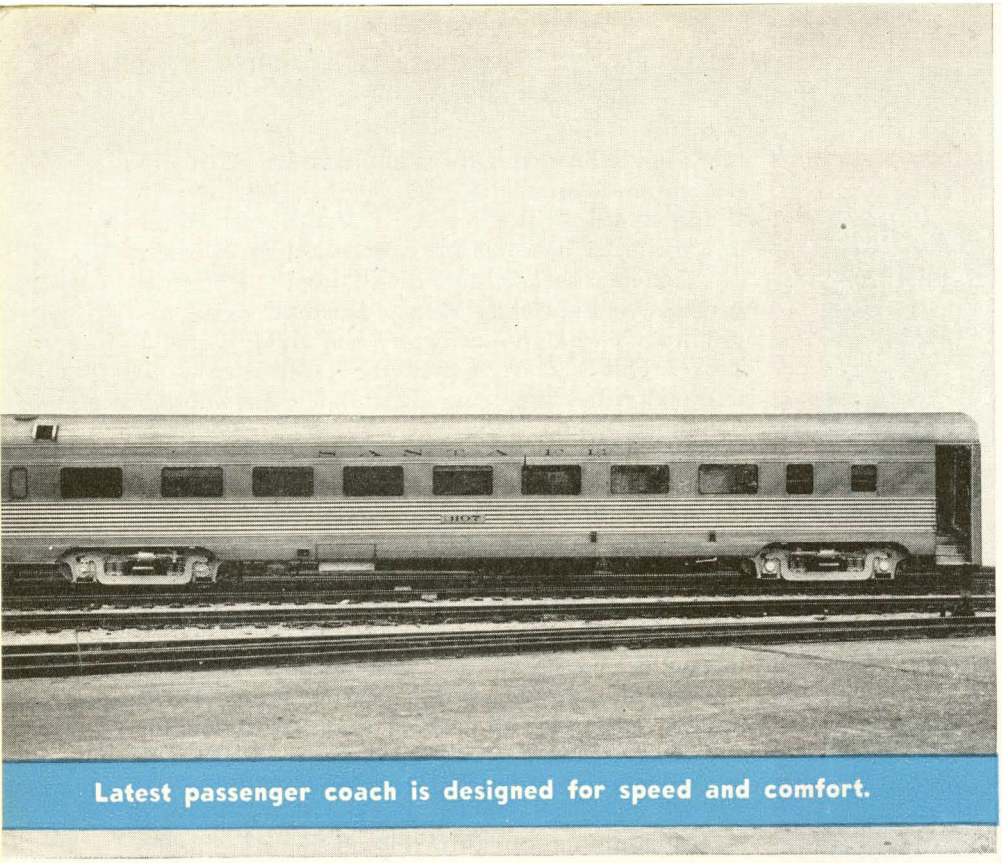
The conductor and rear brakeman ride in the caboose, attached to the rear of the train. Here, the conductor and train crew make their headquarters.

On top of the caboose is an odd-looking little watchtower, or cupola. From his lookout point in the cupola, the rear brakeman watches over the long train of freight cars ahead. He also keeps an eye out for signals from the head brakeman or from the engineer or fireman.

On some Santa Fe freight trains, men in the locomotive cab and in the caboose can talk to each other by two-way radio telephone.

Smoothly, our heavily-laden train slips through the yards. Once on main line track, it begins to pick up speed. From the steel rails comes a steady song. At a grade crossing, the locomotive whistle blows two long, one short, one long, and all over the darkened countryside people lift their heads to listen.

The next time you hear a freight train go by, you will know what it really means. Thousands of freight trains, just like this one, are on the move every moment of the day and night. They are loaded with countless tons of oil and coal, fruit and vegetables, cattle and poultry, timber and machinery, autos and canned goods, with grain and iron ore, with all the rich harvest our nation can reap.



Latest passenger coach is designed for speed and comfort.

Signals flash messages of safety.

Science on the Fast Track

WHAT makes our railroads so rapid and safe—a rich heritage in peace and a mighty weapon in war?

One reason is that for many years our railroads have kept pace with every major advance in science. More than one thousand research engineers and scientists are working to apply the miracles of science and invention to every phase of railroading.

As an illustration, the Santa Fe maintains a modern test department staffed by engineers, chemists and technicians. Their research has led them to analyze iron and steel, fuels and lubricants, timber and ties. From their findings have come faster trains, stronger rails, better roadbeds, and safer bridges.

Santa Fe's research scientists have studied and tested boilers, crank pins, cylinders and wheels using machines that detect flaws hidden deep within the metal. And out of the laboratories of scientists and designers have come locomotives of unmatched power and endurance, scientifically designed sleeping cars and coaches of stainless steel and plastics, and freight cars that are lighter in weight but have greater capacity and strength.

The railroads are planning for tomorrow, but they are working for today. To perfect a single type of brake, the railroads spent more than two million dollars in research alone. Although the brake did not make headlines, trains now come to a smoother quicker stop.

Signal systems, the key to railroad safety, have been constantly modernized. In the early days of railroads, a man had to climb a tall pole and look up and down the track with a telescope. If the track was clear, he would hoist a white ball to the top of the pole. This "highball" could be seen from the approaching train, and meant "proceed," go ahead.

Today, trains are "highballed" by automatic safety signals operated by electricity. These signals are set up along a track every few miles. Some signals are semaphor (paddle-shaped blades) which the engineer can see from a distance. These blades have colored lenses which show their position at night. Other signals have no blades, but simply colored lenses both day and night. The position of the blades, or the color of the lenses tell the engineer whether

there is danger ahead, whether to slow down, stop or proceed.

Snowslides and landslides once menaced railroad operations through mountainous regions. Railroad researchers went to work, and developed an automatic warning device known as a "slide-detector fence." These specially constructed fences are erected wherever danger of slides exists.

The fences are connected by electricity to roadway signals. If ice, snow or rocks slide down on the track, they strike the fence and flash a warning signal. The signal can be seen from an approaching train, far enough ahead for the engineer to stop the train before it reaches the slide.

On Diesel engines, such as Santa Fe's new 5400 horsepower Diesel freight locomotives there is a "dead man's pedal." The engineer must always keep his foot pressing the pedal, or the train will come to a stop. Thus, if the engineer becomes ill, or dies while the train is in motion, his foot will slip off the pedal and the train will stop at once.

Centralized Traffic Control

Along many miles of track our railroads have installed Centralized Traffic Control. C. T. C. is a modern signal system which allows one man at a central switchboard to control the movement of many different trains. On a panel before him, flashing lights indicate the progress of every train along the stretch of road he controls. In cases where trains are operating along a single track, rushing head on toward one another, he flicks a lever which sends one train onto a siding and lets the other one through, neither train having to stop for even a moment.

Pioneering in electronics, Santa Fe now uses radio telephone communication to speed the freights. Engineers up front in trains so equipped are able to communicate by two-way radio with their trainmen, seventy cars behind in the caboose. Some yardmasters now use radio telephones to direct switch engine crews in making up and breaking up trains.

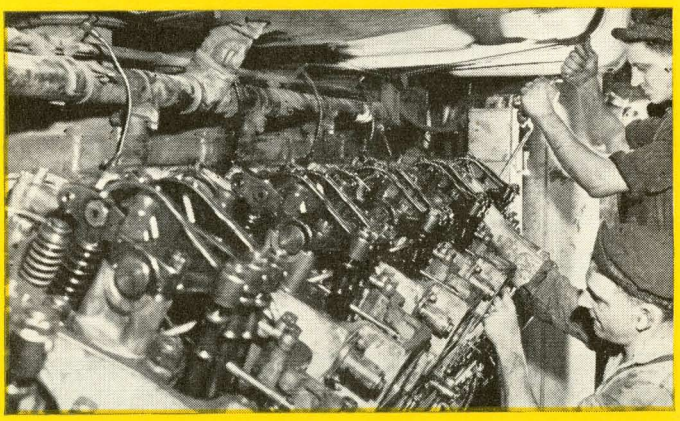
Nor have the railroads overlooked adding to the comfort and delight of passenger travel by rail. Today, air conditioned, stainless steel streamliners like Santa Fe's famed Chief, Super Chief, or El Capitan offer low-cost luxury travel to every one.

Trains of Tomorrow

Now on drafting boards are the blueprints of tomorrow's "super-trains." In the train of tomorrow, you may be able to enjoy television programs as you travel, or watch the scenery through a flexiglass roofed observation car, or telephone your home while the train rolls along at breathless speed.

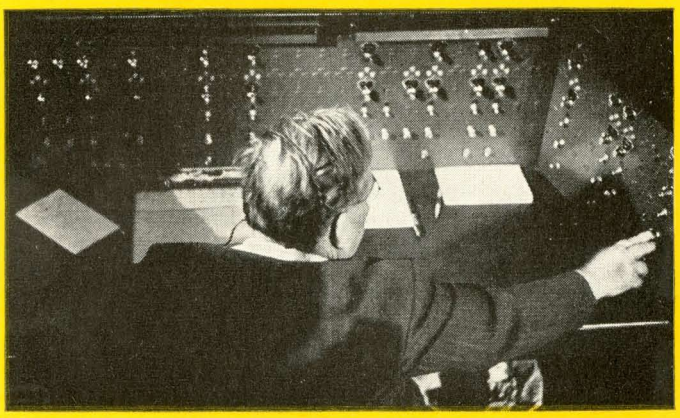
Whatever the future brings, the probing minds of scientists will uncover new secrets in metallurgy, chemistry, electricity and many other branches of engineering.

The engineer sits in his cab and carefully steers this streamlined Diesel locomotive down the tracks.



Mechanics adjust a huge 12 cylinder Diesel engine. Each Diesel locomotive uses two of these engines.

Engineer lifts radio-telephone to give orders to a brakeman in the caboose many cars behind him.



From the panel of a Centralized Traffic Control system, this man guides many train movements.

Indians built the terraced pueblo of Taos long before white men traveled on the Santa Fe Trail.

THE SANTA FE TRAIL

From War Whoop to Train Whistle

SANTA FE was where the trail ended. But what was Santa Fe? Why did men journey to it, thousands of them, across the wilderness of the early West?

Today the capital of New Mexico, Santa Fe began as a nameless Indian village, or *pueblo,* in the wild lands. The Indians built mud huts, hunted buffalo and antelope, and tilled the soil.

Soon to this *pueblo,* walled in by mountains, came traders from other Indian tribes. They came on foot to trade in shells, salt, fur, turquoise, and feathers. From tribe to tribe, across the wastes of half a continent, the trade flowed. Slowly, a trail began to appear—worn into the earth by the tread of thousands of Indian feet.

Then came the horses, brought to the New World by Cortez and his conquerors. Up from Mexico came these strange, four-legged creatures. The Indians learned to ride. The trails grew wider, distances seemed shorter.

Then oxen were driven up from Mexico—and soon replaced the horses as carriers of goods. Oxen could drag wagons—wagons heavily laden with salt, copper, fur, and gold.

Lured by tales of fabulous treasure, the Spaniards journeyed northward from Mexico. First as conquerors, then as settlers, the Spaniards came, bringing sheep and cattle with them.

About the year 1605—the date is not certain—they came upon a deserted Indian *pueblo.* There they built a palace for their governor, a fort, and a cathedral. They named the settlement Santa Fe de San Francisco—the Holy Faith of Saint Francis.

Thus, Santa Fe was born as a city of the white man. No other city—except St. Augustine, Florida—existed in all the United States.

Soon, the white man's trade came to Santa Fe. The eastern trail from Santa Fe met the western trail from New England. Goods poured westward from the factories of Connecticut and Massachusetts. Men began to talk of the Santa Fe Trail—and to drive their pack-mules over it.

The first wagon train, led by Captain William Becknell, set out from Missouri in 1822. After six months, he reached Santa Fe, where his American goods were eagerly bought. Until this time, New Mexico had been supplied from Mexico.

The rush was on! American traders formed their wagon caravans—usually at Independence, Missouri (home of President Truman)—and began the long trek westward. They fought against storm and wind, desert heat and mountain cold. They fought the Pawnees and the Comanches. They would not be defeated!

Then, in 1846, came the Mexican War. Texas had been annexed by the United States the year before. Now, California could no longer endure Mexican rule. When the smoke of battle had cleared, the United States had won New Mexico, Arizona, and California.

But travel westward was still dangerous and difficult. Twenty-two years later the rails of the Santa Fe Railroad opened the great Southwest.

SANTA FE! The very name breathed excitement and adventure. Founded by Spanish explorers it was little known east of the Rockies until 1806. In that year, a band of American soldiers wandered into the Rocky Mountains, looking for Red River. Their leader was Lieutenant Zebulon Pike, who discovered Pike's Peak.

Lieutenant Pike did not find the Red River, but he did re-discover Santa Fe, marketplace for the goods of the Southwest. Its wealth, and its need for American trade excited Pike. He came home to tell of this fabulous city. Soon American traders began to head down the Santa Fe Trail—first one man, then hundreds.

They brought their goods by mule train—two hundred and fifty pounds per mule. Calico cloth, shoes, hardware, handkerchiefs, dishes—simple things which men and women in Santa Fe were eager to buy. Soon the mule trains became wagon trains—wagons drawn by sturdy oxen or by patient mules—wagons of all sorts.

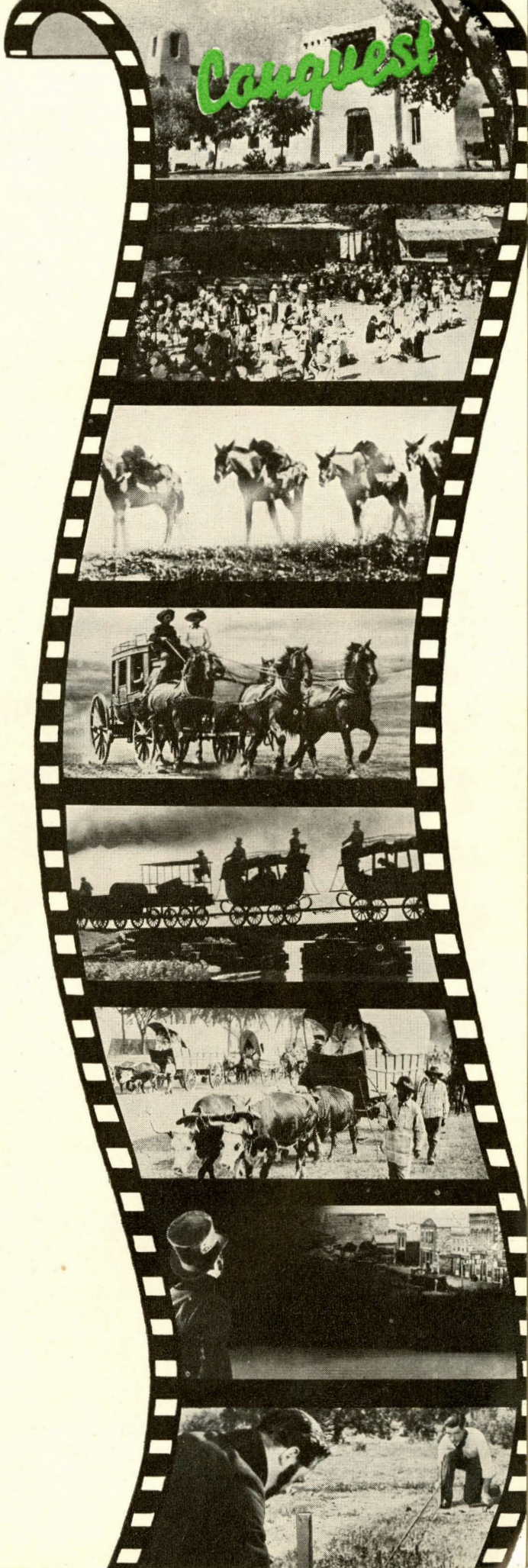
But men were demanding a quicker way to make the journey—a more comfortable method of travel. In 1849 the stage coach appeared along the Santa Fe Trail. It traveled at what seemed like unbelievable speed! You could now travel from Independence, Missouri to Santa Fe in a month—except when Indians were on the war-path.

Meanwhile, farther to the east, a new and magical way of travel had appeared. Men were traveling on rails of steel, in carriages drawn by odd looking machines—"puffing billies" they called them. Steam turned wheels, wheels covered distance, and distance shrank until the Middle West was next door to the East.

All America stirred to the new tempo—to the clicking of wheels, the roar of powerful steam. That is—all America east of the Missouri. On the Western Frontier the slow, measured hooves of horses set the pace. Kansas Territory lay sleepily in the sun. It had not yet heard the song of the rails—of progress.

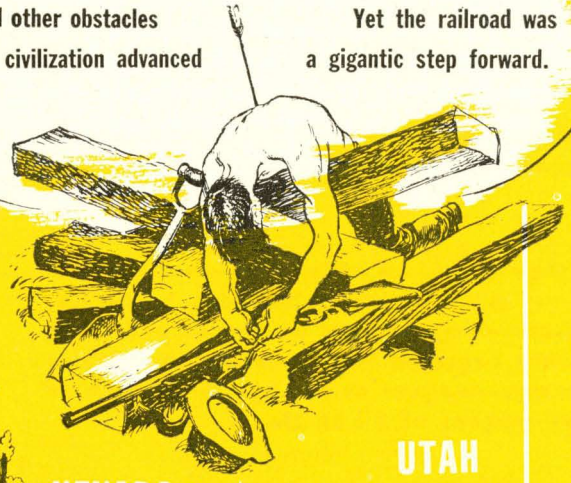
Then, in 1854, a young lawyer named Cyrus Holliday appeared in Lawrence, Kansas. He had come from Pennsylvania with 20,000 dollars in his pocket, a hat full of ideas, and enough courage to dream of great things. He looked over frontier Kansas, and rolled up his sleeves. For a start, he decided to build a city!

He knew that a tide of settlers would soon flow westward. They would need new homes, stores, and warehouses. Together with some friends he had made, Holliday bought the land and laid out the town. Their surveying "instruments" were a watch-charm compass and ropes made from potato sacks. Thus was born Topeka!



the Santa Fe Trail

When the rails pushed westward on the old trail, railroad men fought desert storm and mountain cold, marauding Indians, buffalo, and other obstacles Yet the railroad was built, and civilization advanced a gigantic step forward.



OREGON

WYOMING

CALIFORNIA

COLORADO

NEVADA

UTAH

ARIZONA

NEW MEXICO

Sacramento

San Francisco

YOSEMITE NATIONAL PARK

Lanare

Taft

SEQUOIA NATIONAL PARK

HOLLYWOOD

Los Angeles

San Jacinto

Ripley

San Diego

Phoenix

DUDE RANCHES

Grand Canyon

Fierro

Silver City

CARLSBAD CAVERNS

El Paso

Denver

Pueblo

INDIAN DETOURS

Santa Fe

Albuquerque

Along this OLD SAN

Presidio

Pacific Ocean

N

W Santa Fe E

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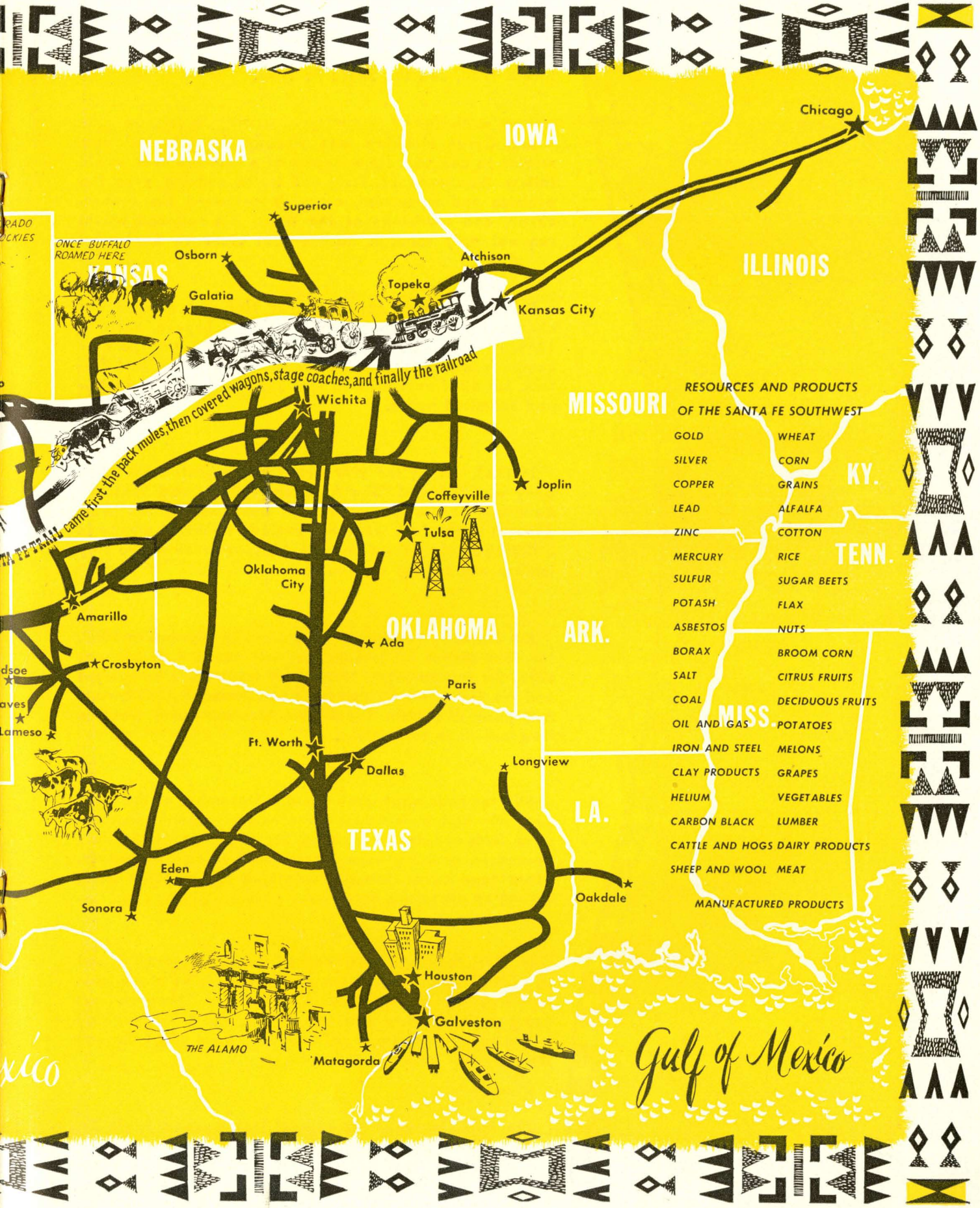
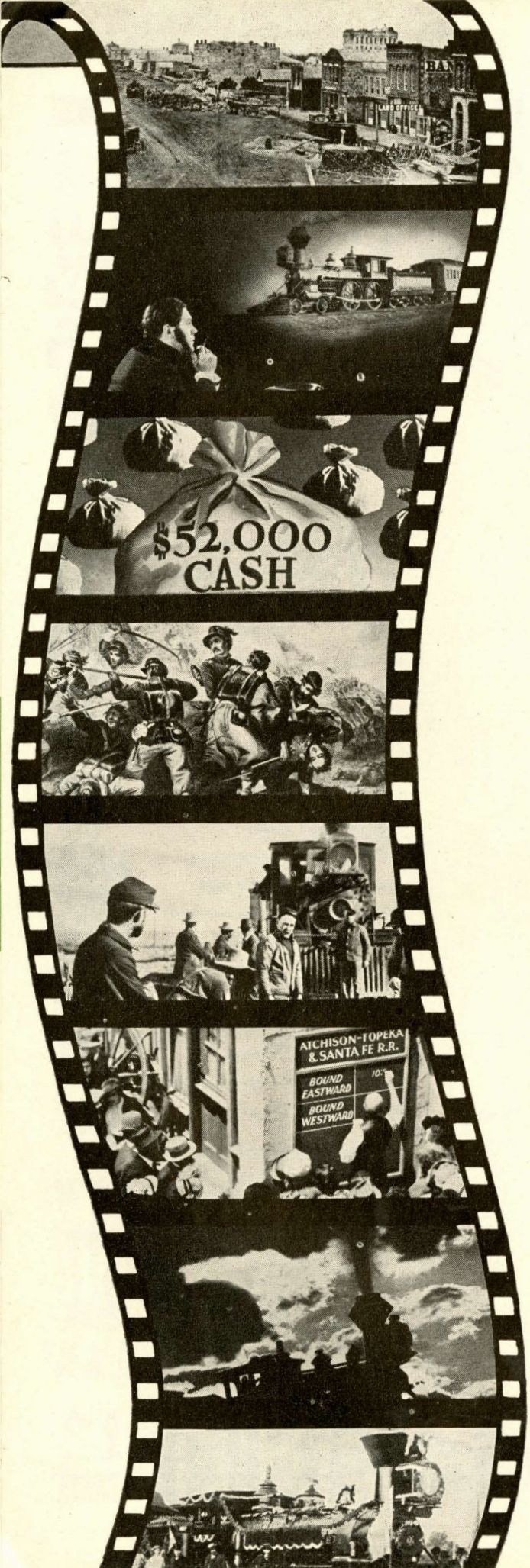

NEBRASKA
IOWA
Chicago
Superior
ONCE BUFFALO ROAMED HERE
Osborn
Atchison
ILLINOIS
Topeka
Galatia
Kansas City
came first the pack mules, then covered wagons, stage coaches, and finally the railroad
Wichita
MISSOURI
RESOURCES AND PRODUCTS OF THE SANTA FE SOUTHWEST
GOLD
SILVER
COPPER
LEAD
ZINC
MERCURY
SULFUR
POTASH
ASBESTOS
BORAX
SALT
COAL
OIL AND GAS
IRON AND STEEL
CLAY PRODUCTS
HELIUM
CARBON BLACK
CATTLE AND HOGS
SHEEP AND WOOL
WHEAT
CORN
GRAINS
ALFALFA
COTTON
RICE
SUGAR BEETS
FLAX
NUTS
BROOM CORN
CITRUS FRUITS
DECIDUOUS FRUITS
POTATOES
MELONS
GRAPES
VEGETABLES
LUMBER
DAIRY PRODUCTS
MEAT
MANUFACTURED PRODUCTS
Joplin
KY.
Coffeyville
Tulsa
TENN.
Oklahoma City
Amarillo
OKLAHOMA
ARK.
Ada
Crosbyton
Paris
Lameso
MISS.
Ft. Worth
Dallas
Longview
LA.
TEXAS
Eden
Oakdale
Sonora
Houston
Galveston
THE ALAMO
Matagorda
Gulf of Mexico



(Continued from page 15)

To-pe-ka, an old Indian name, means "A good place to dig potatoes." Seven years later "the good place to dig potatoes" had grown to such a size, that it was made the capital of Kansas Territory. No wonder! It was located exactly where two great trails crossed—the California Trail, and the Santa Fe Trail.

But Cyrus Holliday was already dreaming of new worlds to conquer. He dreamed of a railroad that would follow the Santa Fe Trail—of trains roaring over the prairies and mountains, carrying eastward the timber, cattle, and foodstuffs of the West. His railroad would run not only through Kansas—but clear to Santa Fe!

Dreaming meant acting. Cyrus Holliday drafted the charter for his railroad, the Atchison & Topeka, early in 1859. It was passed by the Kansas Legislature. The new company was incorporated for a million and a half dollars. But all it actually had was $52,000 dollars in cash—and unlimited hopes.

In 1863, during the War between the States, the company was renamed "The Atchison, Topeka, and Santa Fe Railroad." Little else could be done during the war. Bankers in the East were too panicky to invest money in a railroad out on the Kansas prairies—a place where only Indians and buffalo seemed to live.

But Holliday fought on—and won! In November 1868, the first shovel bit into Kansas soil and a railroad was born. Six months later, 17 miles of track were completed and the first Santa Fe timetable was issued. By 1872, steel had been laid from Topeka to Atchison—then west to Newton—then to Wichita.

Still the rails went west—until in December of the same year, the first train crossed Kansas on the Santa Fe. New days followed for the young State of Kansas. Settlers poured in, prairies were transformed to rich farmlands. Prosperous cattle towns, made rich by trade in beef, sprang up along the line.

In 1876, the steel rails reached Pueblo, Colorado—and in 1878, Trinidad. Only the Rocky Mountains stood as a barrier before Santa Fe could be reached. There was but one gateway to New Mexico—Raton Pass, 8,000 feet high in the bluest of skies. In 1879 the first train crept through the pass and on into Las Vegas.

The following year the rails at last reached Santa Fe, heart of the Southwest. It had taken over 11 years to cover the 853 miles from Missouri—so that men could make the same trip in days. Now a new goal was set—the Pacific. Reaching it meant conquering the desert—fighting off Navajos and Apaches.

And they did! Not only did these railroad builders endure sandstorms, desert heat, and thirst—they fought off Indian attacks, and worked on. More amazing were their engineering feats which carried them across mountains, rivers and canyons. Nothing could stop them now!

All obstacles were overcome, and by 1885 the Santa Fe reached the California seaport of San Diego, and had trackage rights into Los Angeles. Then track was laid or bought, which extended the line through Texas to the Gulf of Mexico, creating new arteries for the flow of trade. But one thing was still needed.

The Santa Fe could handle traffic only as far east as the Missouri River. It needed a direct route all the way to Chicago. Men went to work. Within 11 months bridges were built across the Mississippi, the Missouri, and the Illinois rivers. Within the year, the Santa Fe entered Chicago—rail hub of the nation.

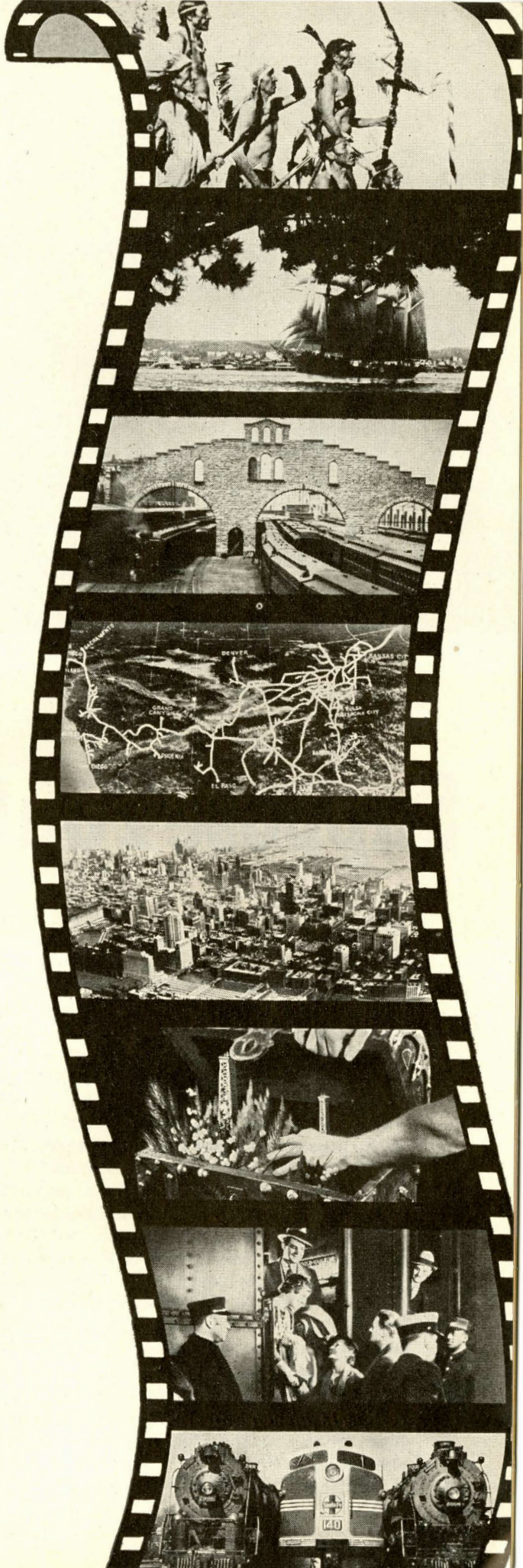
After the panic and depression of 1893, the Santa Fe was reorganized in 1895 into the present company, The Atchison, Topeka, and Santa Fe Railway. Since then, it has built or acquired valuable new lines, including one into San Francisco. The Santa Fe has increased in size until today it stretches more than 13,000 miles.

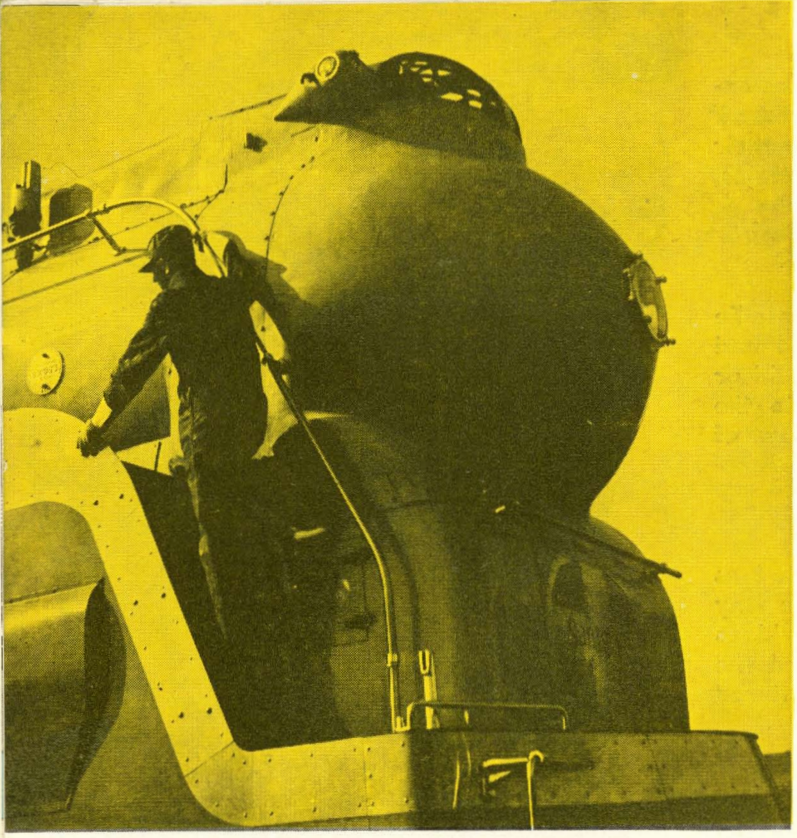
From that day when the first trains went tearing down the track from Topeka to Carbondale, 17 miles away, the Santa Fe has grown until it now extends from Chicago, gateway to the East, to the Pacific Coast; from its line northward to Denver, southward to the Gulf of Mexico and the Mexican border.

Its rails have opened up the vast treasure chest of the Southwest, taking from it the coal and copper, sulphur and potash, "black gold" from the oil fields; millions of bushels of grain, cotton, timber, cattle and sheep, citrus fruits, fresh fruits and vegetables—and bringing these treasures to the far-flung markets of our nation.

But we must not forget that the Santa Fe carries people as well as goods. In a single year, more than 11 million people enjoyed the speed, safety, and comforts of travel on the Santa Fe. Many of these travelers came to see the scenic grandeur of the Southwest—Grand Canyon, Navajoland, Carlsbad Caverns. . . .

For over seventy-five years, the Santa Fe has served the public faithfully. The dream of Cyrus Holliday has been fulfilled beyond his wildest hopes. Today, more than ever, the Santa Fe enjoys the confidence and trust of the public. In its own way, it plays a vital part in shaping the destiny of our nation.





Would you like to own a railroad and climb the cat-walk of a huge passenger engine like this?

Suppose You Owned a Railroad!

HOW would you like to build and operate a great railroad? Many courageous, determined men have spent their lives constructing the great railway systems which span our country. Why not you?

How do you go about it? Well, it may seem that all you have to do is buy some land, build some tracks, and obtain a few trains. That was true once, in the pioneer days. But it isn't as simple as that now.

The responsibility of the railroads in carrying freight, mail and passengers is so important that you cannot build a railroad without government permission. The government agency which regulates railroad services and routes is the Interstate Commerce Commission, sometimes called the ICC.

Not until the ICC decides that your railroad is really necessary, and that it will serve the communities through which it will operate, can you begin. The ICC then will allow you to issue and sell stocks and bonds to finance your railroad. It will grant you a *certificate of convenience and necessity*. This certificate gives you the right to begin building your railroad.

Before this, you would have obtained incorporation papers from the state in which your main offices will be located. By now you are ready to issue and sell stock in your company. It costs thousands of dollars per mile to build a modern railroad. Even if you have several million dollars of your own, it isn't enough. Millions more will be needed to buy land, and to build, equip, and operate your railroad.

As soon as you have enough money to start building, you send out surveyors to mark the right of way. They will look for the route which will be the least expensive to construct and operate.

When the route has been selected, it is necessary for you to buy the right of way from the owners of the land your railroad will cross. The owners may not wish to sell. Or they may hold out for an unreasonable price.

In either of these cases, you may have to appeal to the courts. An appraiser is then appointed who names a reasonable price at which the owner must sell, or a jury fixes the price in what are known as *condemnation proceedings*. The right of the state to compel a property owner to sell his land for "public use" is called the *right of eminent domain*.

Once again, you send out engineers. This time they will decide where the right of way must be graded, or leveled off.

If you cannot avoid a hill or slope, it will be necessary for you to dig a wide cut, or tunnel through it in order to keep your tracks level. For the same reason, you will raise embankments, or "fills," when going through valleys. Remember, you are not building a roller coaster.

You will send tractors and graders to grade the roadbead, making it as level as possible. Other machines, and skilled, hard-muscled men, will lay the wooden ties and fasten the rails in place. Ballast, usually crushed rock, will be placed along the roadbed between and beneath the ties. The ballast will help keep the rails perfectly level. It will also form a somewhat flexible "cushion" which will insure smooth and comfortable riding.

You must hire men and women to keep your trains clean—scrub floors, wash windows, brush seats.

As your railroad advances across plains and deserts, over mountains and across rivers, so must your safety devices advance. Mile after mile of block signals, switches, sidetracks, and telegraph wires must be installed.

There must be freight and passenger stations. The size of a railway passenger station usually depends upon the amount of traffic handled. In large cities, passenger terminals will be big buildings located conveniently in the community. The terminal will contain ticket offices, information booths, waiting rooms, baggage rooms, telephone booths and telegraph offices, restaurants, and often many small shops.

Freight terminals in busy market centers must be equipped with modern freight-handling machines and traveling cranes, which can lift immense steel containers from one open car to another.

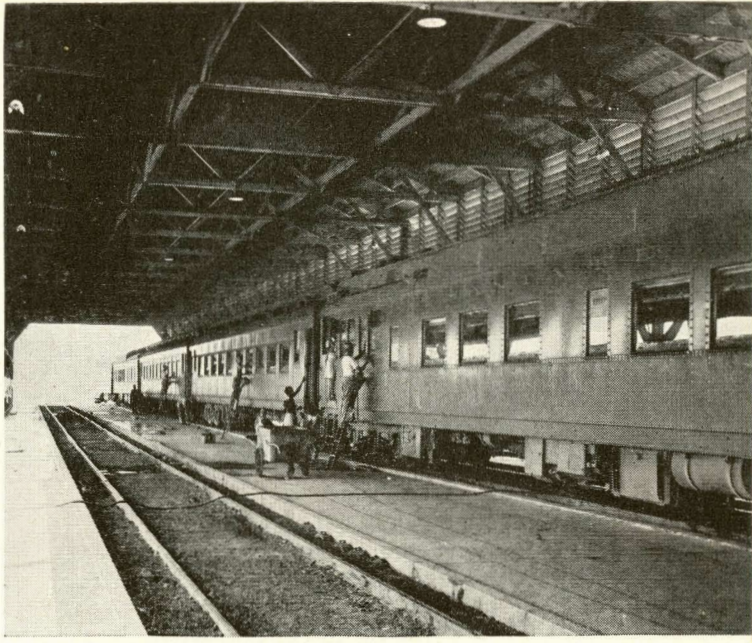
In the freight yards you will need many miles of track to handle the traffic of thousands of freight cars each day.

You will also need warehouses where freight can be stored, grain elevators for storing grain, feeding pens for the livestock carried on your railroad, coal and water stations and many other facilities.

Of course, you must have "rolling stock," passenger locomotives, freight locomotives, passenger train cars and freight train cars. You will also need sturdy little switch engines to shepherd cars into their proper order, as each train is made up.

You must build roundhouses, where the "iron horse" is stabled between runs. Here, locomotives are cleaned and given light repairs. But there will also be large locomotive shops where entire engines can be stripped and rebuilt. There will be car shops, where passenger and freight cars can be repaired if necessary, and worn-out parts replaced. In the yards where the trains are made up, sleeping cars, diners, and coaches must be swept, washed, and stocked for each trip.

Giant locomotive shops are needed to keep the engines in perfect working order at all times.



An Army of Workers

Finally, you will need an army of workers to run your railroad. Besides the men who actually built it, and those who plan schedules and operate trains, there must be carpenters and cooks, doctors and lawyers, electricians and painters, engineers and chemists. In the ranks of your employees almost every trade and profession will be represented.

Now your railroad is complete, but it is only a small fraction of the huge network of railroads covering the United States. Each day thousands of trains speed over this gigantic network of steel. Passenger trains, mail trains, express trains and freight trains, local trains and through trains.

There is action everywhere. Passenger trains flash by at breathless speeds. At the right moment a local moves out to use the main line. Freight trains pick up and drop off loaded cars here and there.

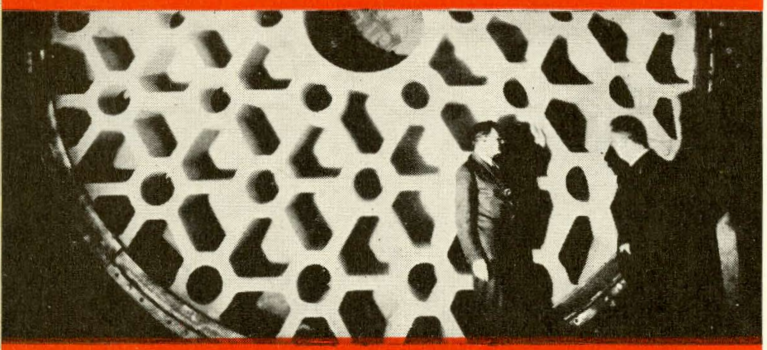
You now own a railroad, part of a great industry whose motto is "Service!" You must always remember your responsibility to the people you serve, the passengers, the shippers, the men and women in countless towns and cities who depend on railroads to deliver the goods.

You have another great responsibility to your stockholders, the business men who invested their faith and their money in your enterprise.

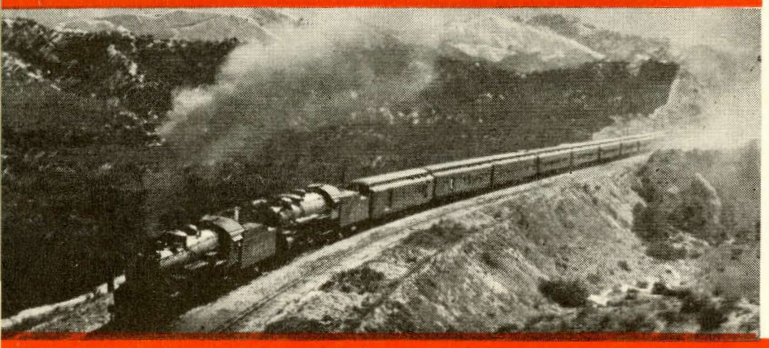
You must do all you can to protect the welfare of your workers. They are the lifeblood of any railroad. They are a race by themselves. They are railroad men, famed in legend and story throughout our country.

Always you will serve America, modestly but with pride, whether she is at war or at peace. As long as your railroad is a free enterprise in a free nation, it will serve as an important cog in the most efficient transportation system on earth.

The railroads were chosen to transport the world's largest telescope lens from New York to California.



Mountains, canyons, rivers do not stop the railroads. Modern railroad engineering conquers natural barriers.



RAILROADS ARE BASIC

PRIMITIVE transportation leaped forward with the invention of the wheel. Modern transportation began in earnest on the day when men placed a flanged wheel on a steel rail.

It is the flanged wheel on a rail that makes the train possible; that enables a powerful locomotive to pull as many as 150 cars in a single train containing up to eight thousand tons of cargo.

It is this kind of mass transportation that made the United States the most prosperous industrial nation on earth. It is this kind of mass transportation that enabled us to become an arsenal of democracy, and to fight a victorious two-front war in Europe and the Pacific.

A flanged wheel on a steel rail. Because of it, cities sprang up, American industry, commerce and agriculture flourished, a united nation was born and refused to perish in war.

Yet, railroads do not handle all the transport work which our nation requires. They never will. Some jobs, such as delivering milk to your doorstep can be accomplished better by other means than by a huge freight train. Other jobs can be accomplished better by an airplane or a truck or a ship or a pipeline. And there are many minor jobs in transportation which can be accomplished best by a boy on a bicycle.

Railroads work at night too. They service the American people twenty-four hours every day in the year.

The mail must go through! Every year billions of pieces of U. S. mail ride swiftly and safely on the railroads.

Railroads Satisfy Basic Needs

All these forms of transportation have their uses. But only railroad transportation can satisfy the giant hunger of our nation's industry, commerce, and agriculture.

Why? Because railroads are true *common carriers*—doing day-in and day-out the essential, universal, low-cost job of mass transportation in a volume which no other form of transportation can even attempt to undertake.

Railroads do not choose their cargo. They will safely deliver a tiny package of gems or a huge telescope lens, a kitchen stove or thousands of tons of iron ore, a single passenger or an entire army.

Railroads will carry that cargo anywhere the steel rails go—long distances from coast to coast, or short distances between neighboring towns, across mountains, plains, and deserts.

Passengers can relax and enjoy every comfort on these sleek streamliners.

Railroads will haul cargo day or night, in summer and winter. When storms, floods, and blizzards rage across the land, the railroads use their own men and their own money to keep the steel highway open.

Transportation Arithmetic

Let's do a little adding and subtracting!

Air transport costs are many times higher per ton mile than those of the railroads. Railroads measure their ton mile costs in mills (tenths of a cent). It costs less than one cent to ship an average ton of freight one mile by train.

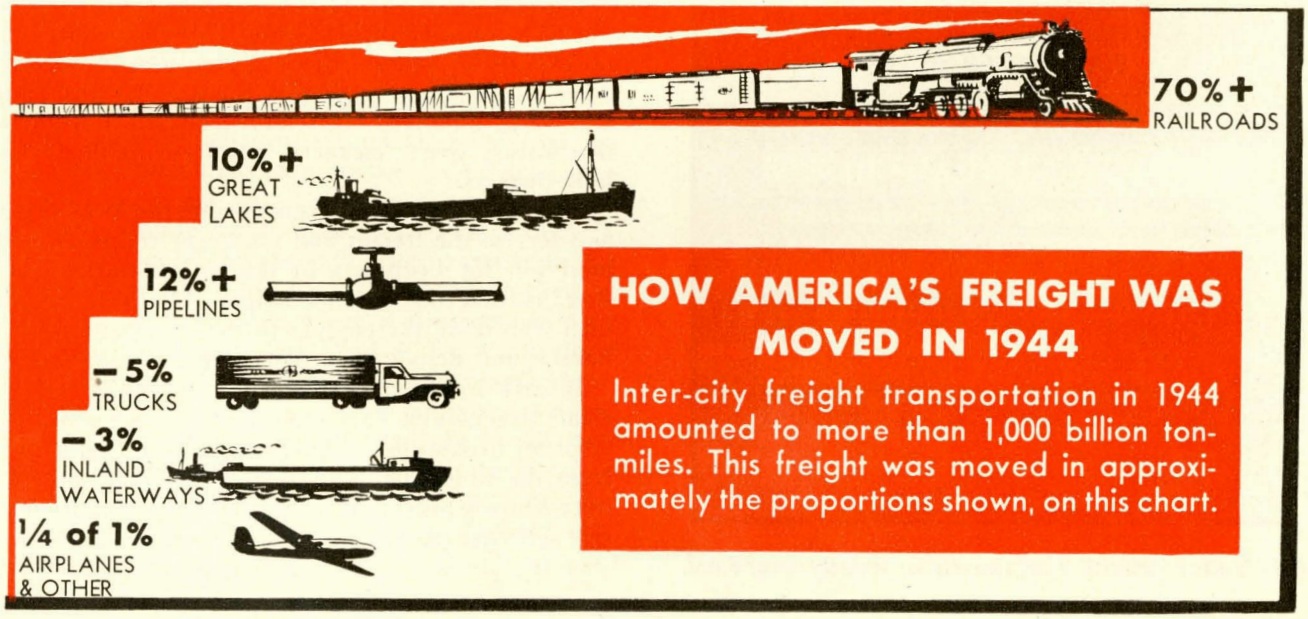
Now let's suppose that all our railroads vanished, as if by magic, and the nation's freight had to travel by truck or by air.

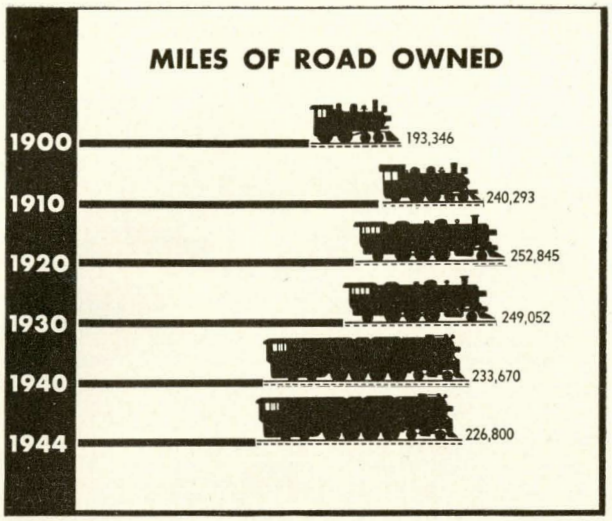
To carry 4,000 tons of freight, a single train of 100 40-ton freight cars would be required. To move the same amount of freight by road, 1,000 4-ton trucks would be needed. To move it by air would require well over 1,000 planes with an average payload of 3 tons.

Or take an ordinary day's tonnage on just one operating division of one railroad serving Pittsburgh, Pa. It would take at least 32,000 five-ton motor trucks to accomplish an equal task—a column of trucks nearly a thousand miles long.

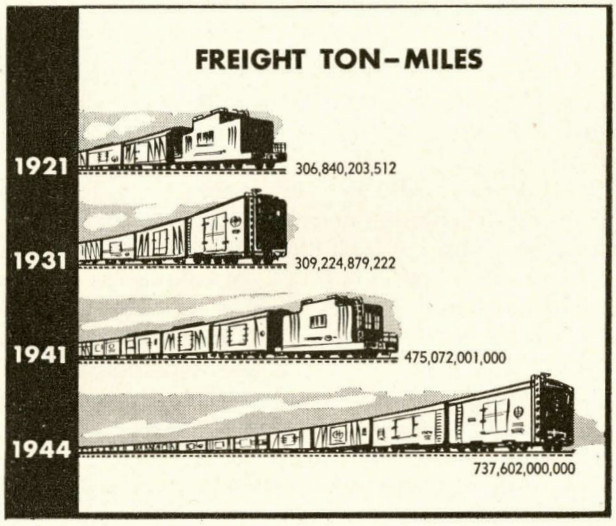
It would be very much the same story for other cities. There would be thousands and thousands of trucks riding bumper to bumper—barring the public highways to motorists, choking the streets of cities and towns all over the country.

But railroads will never vanish. They will grow because America is growing. In peace as in war, they will continue to deliver the goods.

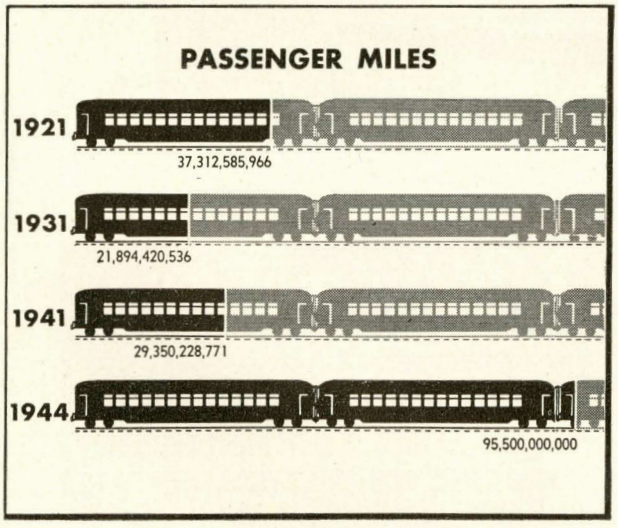




Less miles of road, but more are double track.



Railroads carried record loads during the war.



Passenger travel has shown a steady increase.

SPEAK to almost any top railroad executive, behind his desk in some tall office building, or inspecting a newly developed signal apparatus. You will find that he worked his way up from the ranks.

Perhaps he started his career as a clerk, or a trainman, or a telegrapher. It doesn't matter. If you have the brains, the ability and the stamina, you can go to the top. Opportunity clears the tracks for you, and ambition is always given the green light.

Railroad workers, however humble their task may be, know that this is so. They also know that they are better paid, and enjoy better working conditions, than railroad workers anywhere else on earth.

They are proud of the great work they do, and of the roads they work for.

Variety of Jobs

The million and a half men and women who run the trains, handle the freight, maintain the cars, tracks, and locomotives and keep our great railway systems in operation perform hundreds of different jobs. Some are highly trained clerical workers in the

A CAREER

legal, accounting, and other business departments.

A large proportion of these workers (see chart) is engaged in building, maintaining, and repairing equipment. They work in roundhouses, in car and locomotive shops, and at principal stops along the line.

Workers from almost every skilled trade are employed in railroad maintenance. Those who have had no experience often start as apprentices, or helpers. Some important jobs in this branch of railroading are: gang foremen, blacksmiths, electrical workers, machinists, coach cleaners, painters, welders, and boilermakers.

More than 300,000 workers operate the locomotives and service the freight and passenger trains. A common job for beginners in the transportation division, is that of hostler's helper. Hostlers are the men who drive the engines to the shops and roundhouses, and deliver repaired engines to their crews.

In each locomotive, whether passenger or freight, there is generally an engineer and a fireman. The engineer drives the locomotive, and is in charge of it from the time he reports to work until he goes off duty. During his run, the engineer on a steam locomotive sees that the right pressure is kept in the boiler; that the air brakes are working properly; and that

the generators are providing electric current for the headlights and trainlights. With one hand on the throttle, he watches the gauges and instruments, keeping an alert eye on road signals.

The fireman, as his assistant, is responsible for keeping the proper amount of fuel in the firebox, and water in the boiler. Large locomotives are equipped with automatic stokers, and many other automatic devices. But in smaller steam engines the fireman must shovel in the coal by hand. He also helps the engineer watch signals and the right of way.

On the train itself there is a conductor and generally his crew of one or more brakemen. The conductor and the engineer receive duplicate train orders. They work together to make sure that the train completes its run safely and on schedule.

The brakemen couple and uncouple cars, set warning signals when the train makes an unscheduled stop, and assist the conductor to safeguard his passengers or freight.

A large number of railroad workers maintain the right-of-way. They build the roadbeds, lay track,

ON WHEELS

erect bridges, and repair or replace rails and ties. They also keep the signal system running, clear track of snow and sand, and repair damage caused by washouts and storms.

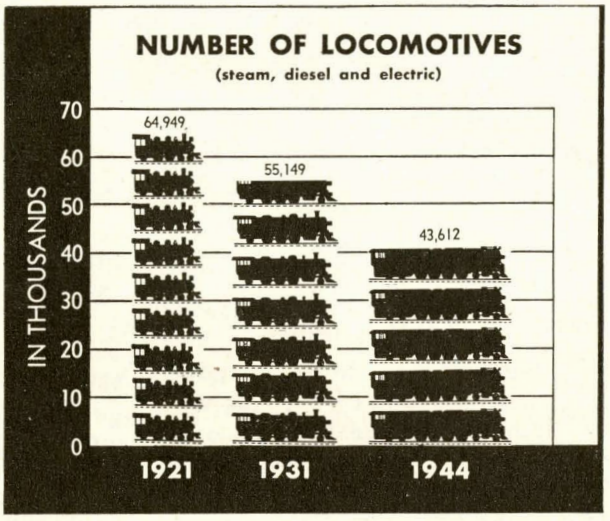
Some of the jobs performed in maintaining right-of-way are those of: section men, section foremen, carpenters, signalmen and signal maintenance workers, helpers and apprentices, ironworkers, masons and linemen.

Operating Divisions

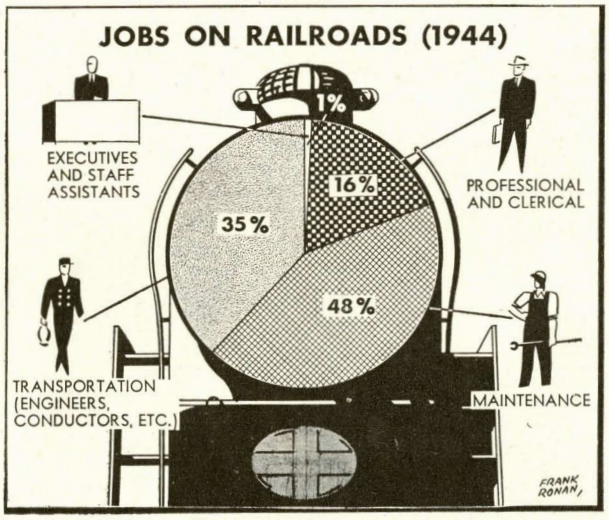
The operating departments of large railways are so complex that they must be broken up into divisions. Each division with a superintendent in charge, is responsible for operations on a portion of the railroad. Division headquarters is a nerve center in the railroad network. Here, we find train dispatchers at work who keep tabs on every train movement in their division. They send their orders via Centralized Traffic Control and by telegraph and telephone to operators who deliver the orders to the train crews.

And there are hundreds of other jobs in railroading, in the Engineering Department, in the Purchasing and Stores Department, in Traffic Departments.

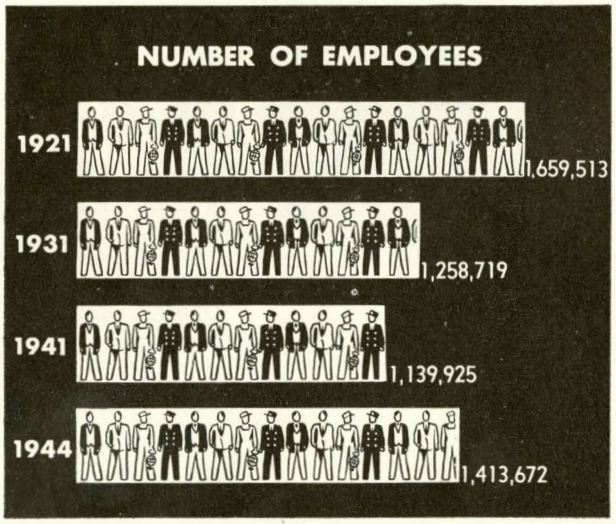
Railroads offer youth a career that is bright with promise.



Fewer, but more powerful locomotives are used.



Maintenance uses largest proportion of workers.



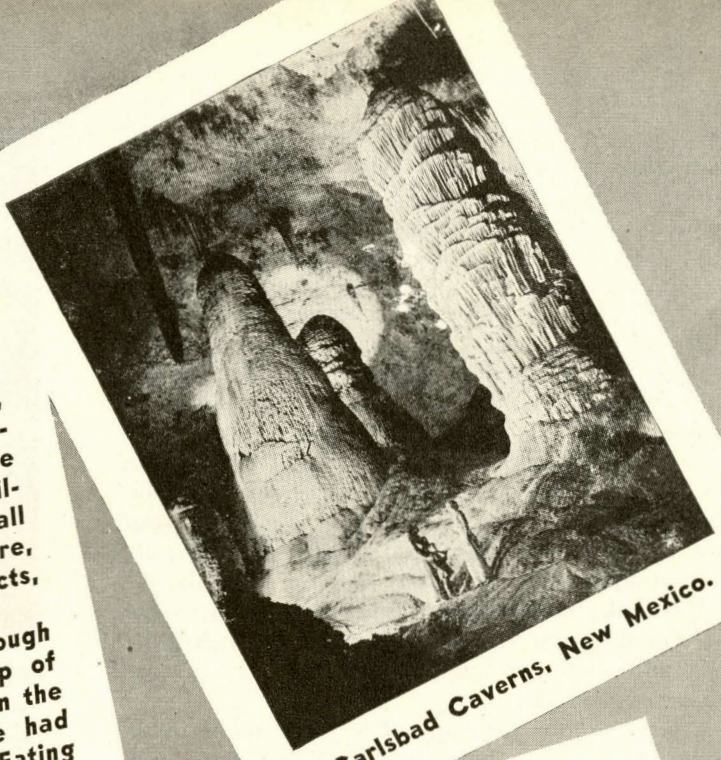
Nearly a million and a half workers in 1944!

A Travel Diary

MOTHER, Dad, Sis, and I boarded the train in Chicago. Our train is called the Chief, and is it keen, streamlined, fast, and roomy!

Chicago is a great railroad center. Trains bringing citrus fruits and fresh fruits, vegetables, grain, corn and wheat arrive daily from the West. Carloads of cattle pour into Chicago, because it is the largest meat-packing center in the world. The railroads also carry many things from Chicago to all parts of the country: farm machinery, furniture, electrical equipment, packing house products, autos, and many other things.

Soon the Chief was speeding westward through the cornfields of Illinois and across the tip of Iowa. By the time we sat down to supper in the dining car operated by Fred Harvey, we had crossed the Mississippi River into Missouri. Eating in the dining car was just like eating in a fine restaurant. The table linen was spotless, the silverware shone, and the food was swell.



Carlsbad Caverns, New Mexico.

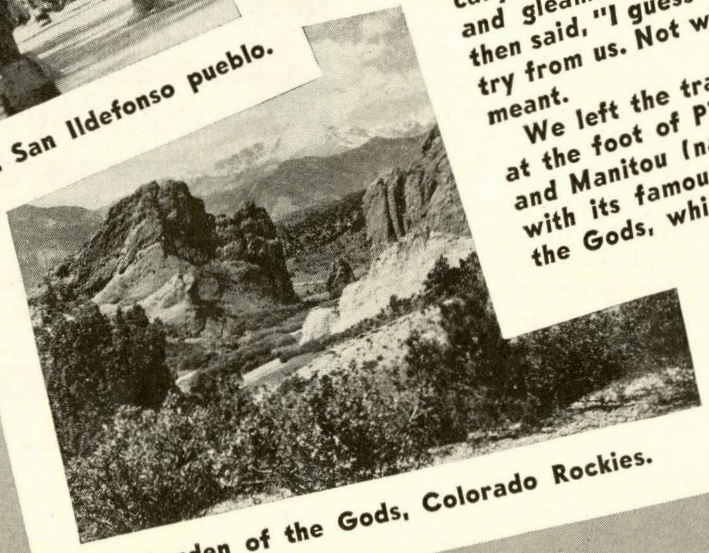
After dinner, we went back to our drawing-room. Mother said it was as comfortable and handsomely furnished as our own living room. Dad and I played checkers, while Mother and Sis watched the scenery. Later, the porter came and made up our beds. I fell asleep long before our train reached Kansas City.

Beyond Kansas City our train followed the old Santa Fe Trail across the wheat fields and ranges of Kansas, and climbed the Colorado foothills to La Junta. At La Junta, we changed trains to visit the Colorado Rockies.

The Colorado Rockies are reached through the city of Pueblo, which the conductor told us is called the "Pittsburgh of the West." This is because it has great smelting and steel works. Our train sped on past snow-capped mountains, rugged canyons, rushing streams, deep, green forests, and gleaming waterfalls. Dad watched a while, then said, "I guess no one will ever take this country from us. Not without a fight." I knew what he meant.

We left the train at Colorado Springs, nestled at the foot of Pike's Peak. We saw Long's Peak, and Manitou (named after the great Indian god) with its famous mineral springs; the Garden of the Gods, which nature carved out of redstone;

Indian dance at San Ildefonso pueblo.



Garden of the Gods, Colorado Rockies.

the Cave of the Winds, a large underground cavern of sixteen chambers; and Seven Falls in Cheyenne Canyon.

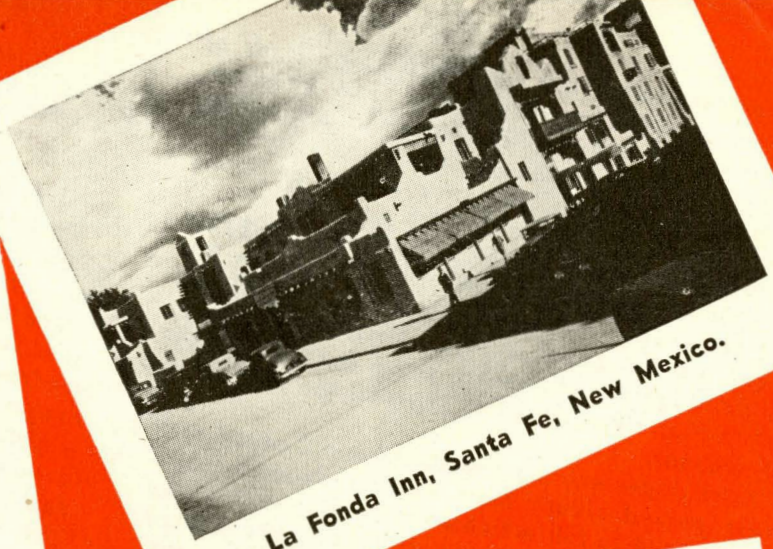
After a few days we went to Denver, the capital of Colorado. From Denver, the "mile-high city," we made a short trip to Rocky Mountain National Park. Here we saw some of the 46 snow-capped peaks which are over two miles high. Dad and I went fishing in one of the large lakes (there are two hundred of them), while Sis and Mother went horse-back riding along the mountain trails.

Several days later we took a train south to New Mexico, and soon reached Santa Fe. There we stayed at La Fonda Hotel, and explored old Santa Fe. We went to see the Mission of San Miguel, the oldest church in America; the old Palace of the Governors; and other colorful, historic places.

The following morning we left by motor-bus to begin a three-day Indian detour, a trip which led us to pre-historic cliff dwellings, old Spanish missions and picturesque Mexican villages.

The ancient cliff-dwellings at Puye, cut in bare rock, are the only remaining traces of a forgotten people. To right and left, as far as we could see, the sheer stone wall was honeycombed with dark openings—caves where men once lived.

All of us were excited too, by the ancient



La Fonda Inn, Santa Fe, New Mexico.

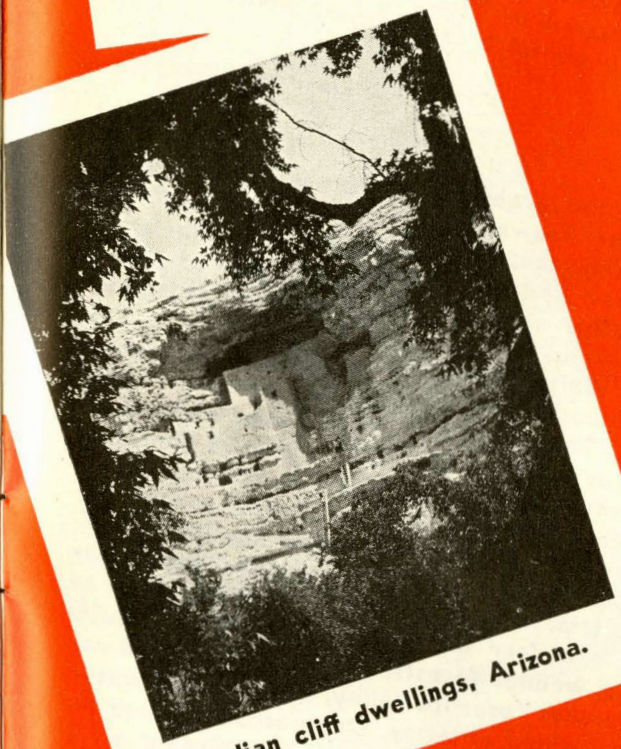
pueblos of the Santa Clara and Taos Indians. The Taos pueblo consists of five terraces, and is the highest in the Southwest. For a background it has a range of forested peaks 12,000 feet high. No wonder so many fine artists come to Taos to paint!

Of course, I had my biggest thrill when we visited the house where Kit Carson, greatest of Indian scouts, once lived. We were in real Santa Fe country, and where we stood had passed the moccasined-Indians, the steel-clad adventurers of Spain, and the wagon-trains of pioneers.

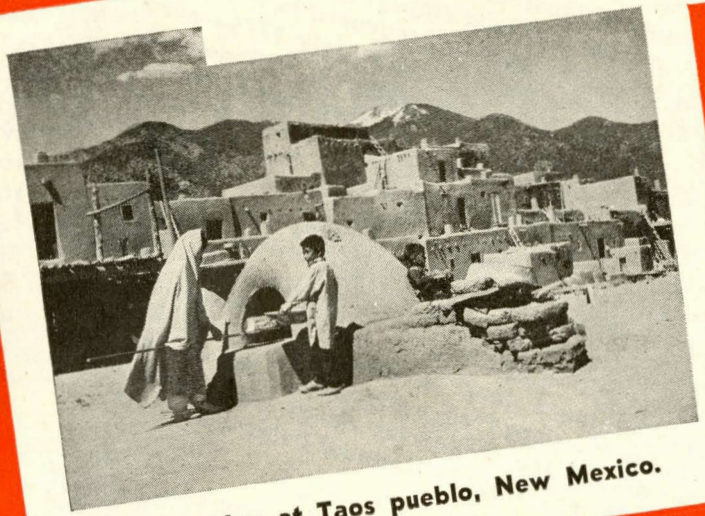
We all decided that we couldn't leave the Santa Fe region without at least a day or two at a dude ranch. That was fun! We rode the cow ponies, saw a real Wild-West rodeo, tried our hand at roping steers, and had a grand time. In the evening, we attended an old-fashioned barn dance, and danced to "Turkey in the Straw" and other old tunes.

In New Mexico, too, are the famed Carlsbad Caverns—and we still can't believe what we saw there!

The Carlsbad Caverns are immense subterranean chambers—caves so deep that men feared to explore them for many years. For a million years, water charged with carbonate of calcium dripped from their high roofs. In this way, thousands of gleaming "icicles" of stone were formed. The



Indian cliff dwellings, Arizona.



Baking day at Taos pueblo, New Mexico.

caverns themselves are formed of many kinds of rock—some rocks are snow white, some are black, some are gray, and some are brick red. Still others are jade green, or pink. Each chamber seems to be in different colors, and filled with strange and beautiful rock formations.

We had our lunch in one such cavern, probably the only dining room in the world which is 750 feet below the earth's surface. Then we continued to explore the caves, our path lighted by powerful floodlights. Afterward, tired but happy, we entered an elevator which reached the surface in 60 seconds.

Next stop—Arizona and the Grand Canyon. Our train passed riders from several dude ranches. It was hard to tell which were real cowboys, and which were dudes. Jiminy! It looked like lots of fun. Indians rode by, too. They were Navajos, wearing bright velvet shirts, bright head bands, and silver jewelry. Their home is a great Indian reservation of 15,000,000 acres. There they herd their sheep and goats, roam the desert, and weave the blankets for which they are famous.

The only railroad entering Grand Canyon National Park—the Santa Fe—goes directly to the south rim of the canyon. Here a village called Bright Angel has sprung up—a village of log, stone and adobe cabins. We stayed at El Tovar, which is built of boulders and pine logs. It is perched on the very rim of the canyon.

Mother wanted us to see Grand Canyon from every angle—so we mounted sure-footed mules, and set out to explore the gigantic chasm. The Grand Canyon of Arizona is from four to eighteen miles wide at the rim, a mile deep, and over two hundred miles in length. From its depths rise whole ranges of mountains, and between them surges the mighty Colorado River. Sis said that the lights, colors, and shadows of the canyon changed so fast, she could never describe it!

I told the family what I'd learned in school about soil erosion. That was how the Grand Canyon was formed—by the action of running water, wind, rain, snow, heat and cold. It's the best example in the world of what happens when soil is not protected from the elements. Even Dad looked impressed.

After Grand Canyon, we all wanted to see more of Arizona. Mother suggested a trip to Phoenix, one of the chief cities of the Southwest. Early settlers gave the city this name because it was built near the ancient ruins of an unknown race. They named it "Phoenix" for the mythical Phoenix bird which rises from its own ashes.

Before leaving Arizona, we stopped to see the famous Petrified Forest—a forest turned to stone by centuries of time.

Then we were en route for California, the all-year playground of America. Our first stop was the City of the Angels—Los Angeles. It was exciting to be in a city that was under Spanish rule more than 160 years ago. Dad and I visited a genuine Mexican street market and ate tortillas, which are a kind of pancake. Sis and Mother spent the day in nearby Hollywood, watching the stars make motion pictures. The next day we all went swimming and surf-board riding at Santa Barbara. Dad, being an old Navy man, wanted to re-visit San Diego, base for our Pacific Fleet. So off we went to this sunny, colorful seaport, with its 22 square miles of landlocked bay.

San Francisco, our next stop, is one of the great cities of the world. It was discovered in 1769, and the first settlement was made in July 1776—even as the Liberty Bell was ringing in Philadelphia. The gold rush of 1849 transformed San Francisco into a young metropolis. Today the city is famed for its two immense bridges—the San Francisco-Oakland Bridge and the Golden Gate Bridge. We visited some of the city's forty-nine beautiful parks, rode the cable-cars, and visited San Francisco's famous Chinatown. The City of the Golden Gate, as San Francisco is called, boasts a harbor having more than seventeen miles of berthing space for ships from every part of the world.

Among the wonderful things we saw in California was Sequoia National Park, which contains the oldest and largest trees in the world. The largest and best known of the Big Trees is called The General Sherman. It measures 36 feet in diameter at the base, and is 272 feet high! Some of these trees, mother says, are older than the pyramids of Egypt—and are still growing!

Mount Whitney, which we saw from a distance, is the highest peak in the United States—14,495 feet tall. There are more than 40 peaks, with elevations of over 13,000 feet, in this part of the Park. And in the same county as Mount Whitney which is the highest point, is Death Valley, the lowest point in the U. S.—276 feet below sea level!

Yosemite National Park was the thrilling climax of our trip. The park embraces 1,776 miles of scenic grandeur — waterfalls, glaciers, swift streams, wooded forests, and flower-carpeted valleys. Famous Yosemite Valley, with its giant waterfalls, delighted all of us. One cascade, called the Bridal Veil, falls 620 feet, and is so slender a column that it disappears in spray and mist. Tallest cascade of all is the Ribbon, with an unbroken drop of 1,612 feet. From Glacier Point, we gazed down into Yosemite Valley—3,262 feet below.

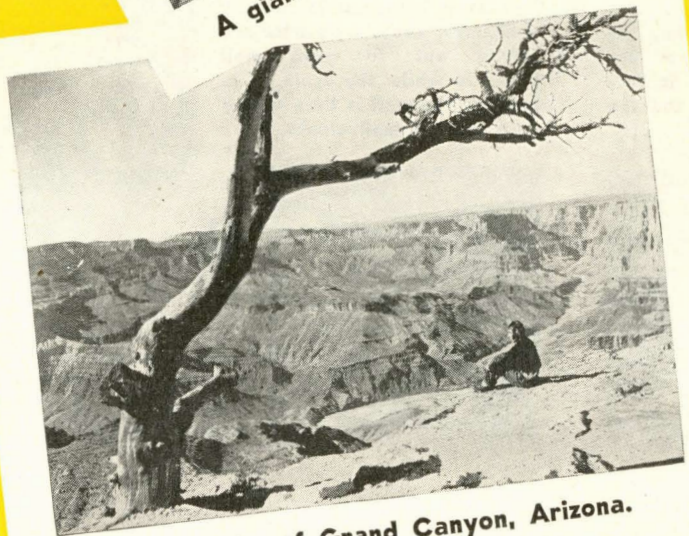
Finally, our trip came to an end. We all felt sad about returning. But perhaps next summer we will again head westward along the Santa Fe Trail.

Grand Canyon, Arizona.

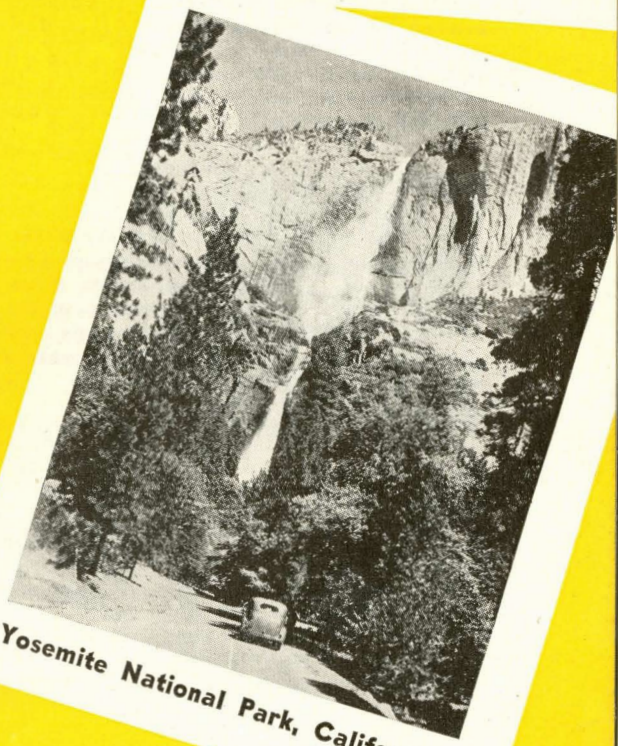
Dude ranch in Arizona.

A giant sequoia tree, California.

A Mexican village, California.

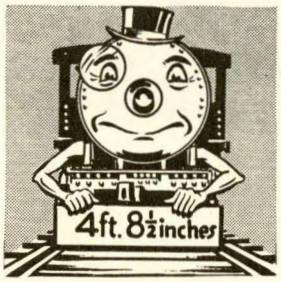


On the rim of Grand Canyon, Arizona.



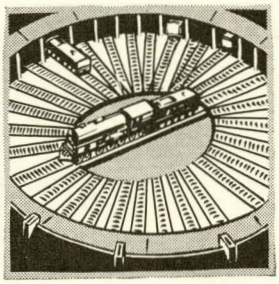
Yosemite National Park, California.

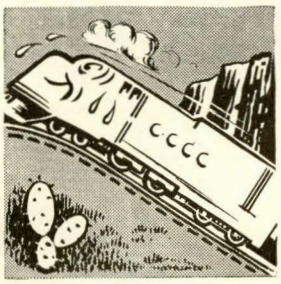
RAILROAD TALK



STANDARD Gauge: Gauge is the distance between the two rails in a track. Standard gauge, used most often, is 4 feet 8½ inches. When early English locomotives of this gauge were brought to the U. S. track was laid to fit them.

ROUNDHOUSE: A circular shaped building where locomotives are cleaned and given light repairs. Each roundhouse has a turntable, which faces the locomotive in the direction of the stall in which the locomotive will be cared for.



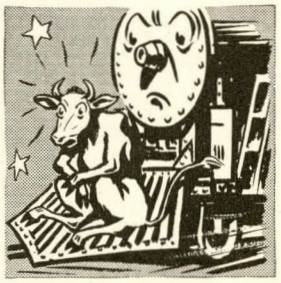


GRADE: The grade of a track is the rate at which it climbs or descends from level ground. Level track is known as zero grade. A climb of 2 feet in 100 feet of track is known as a 2 per cent grade.

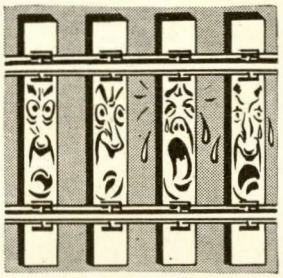
TRACK pan: A water trough, several thousand feet long. When a locomotive tender needs water, the fireman lowers a scoop, and the speed of the locomotive forces water up into the tender.

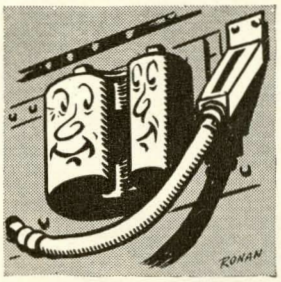
RIGHT-OF-WAY: The strip of land, varying in width, on which the railroad and its facilities are built. It is wide enough for tracks, signals, telegraph and telephone lines, sidings, and other needs.

COW-CATCHER: A V-shaped bumper on the front end of a locomotive. In early days, so many cows wandered onto the tracks, that a young American railroad man invented the device to prevent accidents.



CROSS-TIES: Blocks of wood to which the rails are spiked. The ties themselves are embedded in the ground, thus securing the rails to the ground. Cross-ties are treated with creosote and other chemicals for longer wear.

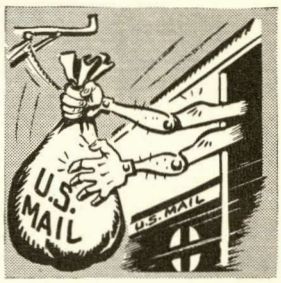


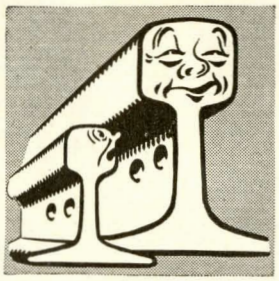


COUPLERS: Automatic devices used to fasten locomotive and cars together in a train. Early "link-and-pin" couplers forced trainmen to go between cars to couple them. Today's couplers are automatic.

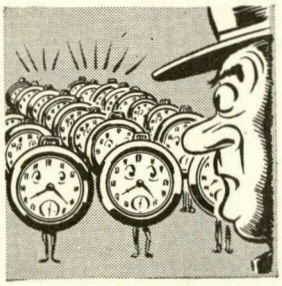
CAR-DUMPER: A machine which grips a freight car, turns it upside down to dump its contents, places the car upright again and kicks it forward to make ready for the next.

MAIL bag catcher: Movable iron arms attached to railway mail cars. These iron arms are swung out to grab mail pouches while the train is in motion. The mail is then sorted en route by mail clerks.





HIGH iron: Main line track of heavier than average rail. Rails range in weight from 50 to 152 pounds per yard. Their standard length is 39 feet. The heavier the rail, the more punishment it can stand from fast, heavily loaded trains.



WATCH inspection: So vitally important is correct time in railroad operation, that watches must be carefully inspected at least once a month. A watch cannot pass inspection if it varies more than 30 seconds per week.

A Railroad Quiz

Early Railroads

UNDERLINE the endings that correctly complete the following statements. Score 6 points each. Total, 30.

1. George Stephenson's prize winning locomotive was called (a) The Shooting Star; (b) The Whizz-bang; (c) The Rocket.

2. The Stourbridge Lion was (a) a hotel in England; (b) a locomotive brought to this country from England; (c) a lion in the Stourbridge zoo.

3. Just before the Civil War, George Pullman built the first (a) railroad tunnel; (b) caboose; (c) model railroad; (d) sleeping car.

4. Before the Westinghouse air brake was invented, trains were stopped by (a) turning off the steam; (b) throwing out an anchor; (c) setting each brake by hand.

5. The Bessemer process allowed railroads to use steel rail instead of iron. Steel was better because (a) it was easier to carry; (b) it was tougher and stronger; (c) it cost less to make.

My score is_____

Along the Trail

UNDERLINE the correct answers to the following questions. Score 6 points each. Total, 30.

1. The capital of New Mexico, Santa Fe, began as an Indian pueblo. What made other Indians travel there? (a) They wanted to hunt buffalo; (b) they wanted to trade in shells, salt, fur, and turquoise; (c) they wanted to find out how a pueblo is built.

2. Santa Fe is the next to the oldest city in the country. What city is older? (a) Boston, Massachusetts; (b) Los Angeles, California; (c) St. Augustine, Florida.

3. The first wagon train for Santa Fe set out from Missouri in 1822. Who was its leader? (a) Captain William Becknell; (b) Kit Carson; (c) a Comanche chief.

4. Cyrus Holliday founded Topeka, Kansas. Why did he choose this location for his city? (a) Because it was a good place to dig potatoes; (b) because it was where the California and Santa Fe trails crossed; (c) it reminded him of his home in Pennsylvania.

Rolling the Freight

BELOW are lists of words dealing with freight transportation. In each group you will find one word that does not belong because it has no relation to other words in the group. Underline that word. Score 5 points each. Total, 20.

1. hopper, gondola, stock, barge.
2. tonnage, load, tie-plate, cargo.
3. ballast, coal, oil, electricity.
4. consist, waybill, signal, train list.

My score is_____

Travel Guide

UNDERLINE the correct endings to each of the following statements. Score 5 points each. Total, 20.

1. The Grand Canyon of Arizona was formed by (a) erosion; (b) an explosion; (c) corrosion.

2. The Carlsbad Caverns are famous because (a) they are the site of a European health resort; (b) they are deep holes dug by prehistoric man; (c) they are underground caves formed by nature.

3. Phoenix, Arizona was built near ruins left by an ancient race. A Phoenix is a (a) kind of chicken, raised by the early settlers; (b) mythical bird supposed to rise from its own ashes; (c) wildfowl.

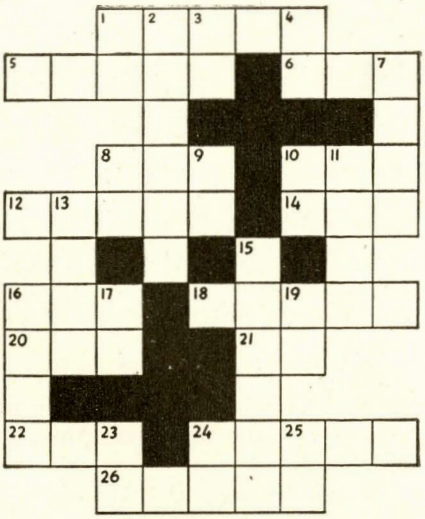
4. The highest peak in the United States is (a) Mount Whitney; (b) Mount Everest; (c) Pike's Peak.

My score _____

My total score _____

Answers to Railroad Quiz

1. *Early Railroads*: c,b,d,c.
2. *Along the Trail*: b,c,a,b.
3. *Rolling the Freight*: barge, tie-plate, ballast, signal.
4. *Travel Guide*: a,c,b,a.



across

1. It supplies power and turns wheels.
5. A mountain pass in the Rockies.
6. Tank cars bring it to the East.
8. Pigs sleep in them between trips.
10. A mineral spring such as Manitou.
12. Compressed air works it.
14. A custom which lasts a short time.
16. A conductor wears his badge there.
18. Railroad car where food is served.
20. From mines it goes in hopper cars.
21. What the green light means.
22. Government bureau which regulates railroads. (Abbrev.)
24. Where cars are made-up into trains.
26. Diesels can't work without it.

down

1. Saint (Abbrev.)
2. Cyrus Holliday built it, and began his railroad there.
3. The 14th letter of the alphabet.
4. A state in the Middle West. (Abbrev.)
7. Freight cars can stand a lot of it.
8. An affectionate nickname for father.
9. A point on the compass. (Abbrev.)
10. Initials of a great railroad.
11. Trains travel at a quick one.
13. Noise made by escaping steam.
15. A semaphore or colored light.
16. Indian tribe in northern Arizona.
17. Topographical Engineer. (Abbrev.)
19. Number (Abbrev.)
23. Cost and Freight (Abbrev.)
24. You (old-fashioned)
25. Abbreviation for Royal Society.

Solution to R.R. Puzzle

ACROSS: 1—steam; 5—Raton; 6—oil; 8—pen; 10—spa; 12—brake; 14—fad; 16—hat; 18—diner; 20—ore; 21—go; 22—ICC (Interstate Commerce Commission); 24—yards; 26—fuels.

DOWN: 1—St.; 2—Topeka; 3—en; 4—Mo.; 7—load; 8—pa; 9—NE; 10—SF (Santa Fe); 11—pace; 13—roar; 15—signal; 16—Hopi; 17—T.E.; 19—no; 23—c.f.; 24—ye; 25—R.S.

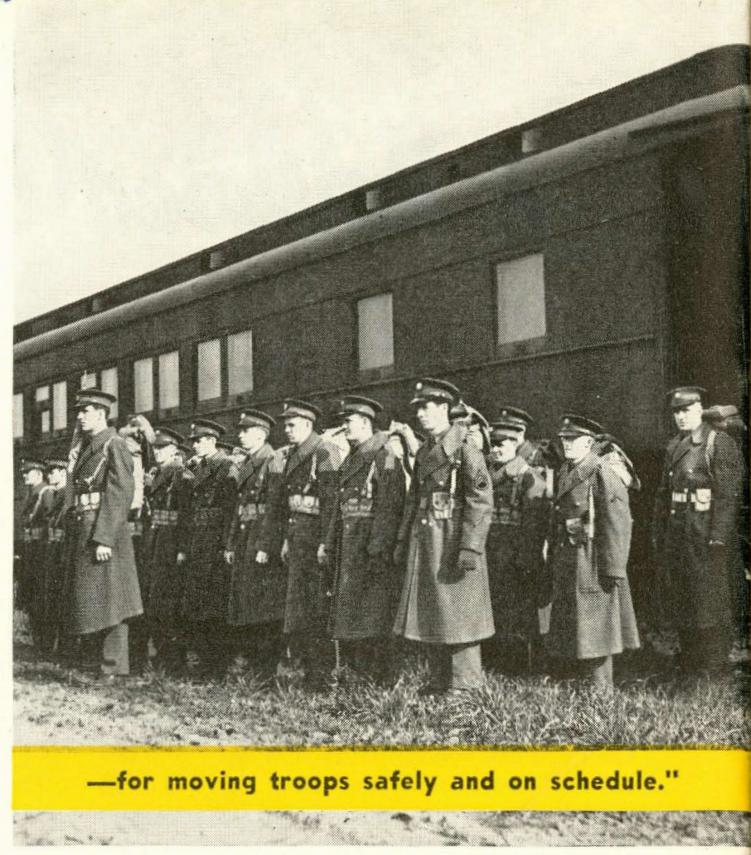
"THE railroads are essential to our nation's capacity to make war. That was proved in World War I and has again become overwhelmingly evident in this war. They must be sustained by the American people with full appreciation that they are vital to us and must always be prepared to go into action to make effective the might of the United States." *Major General Charles P. Gross, Chief of Transportation, U. S. Army.*

Early in 1942, German Propaganda Minister Joseph Goebbels boasted to the world that Germany would win the war, that America would lose, must lose!

Why? Because, cried Goebbels, American railroads were not equipped to handle the gigantic task of wartime transportation. He pointed out (and for once he did not lie) that America had 22,000 fewer locomotives and 600,000 fewer freight cars than in 1918, during World War I. There were also 500,000 fewer men working for American railroads than in 1918.

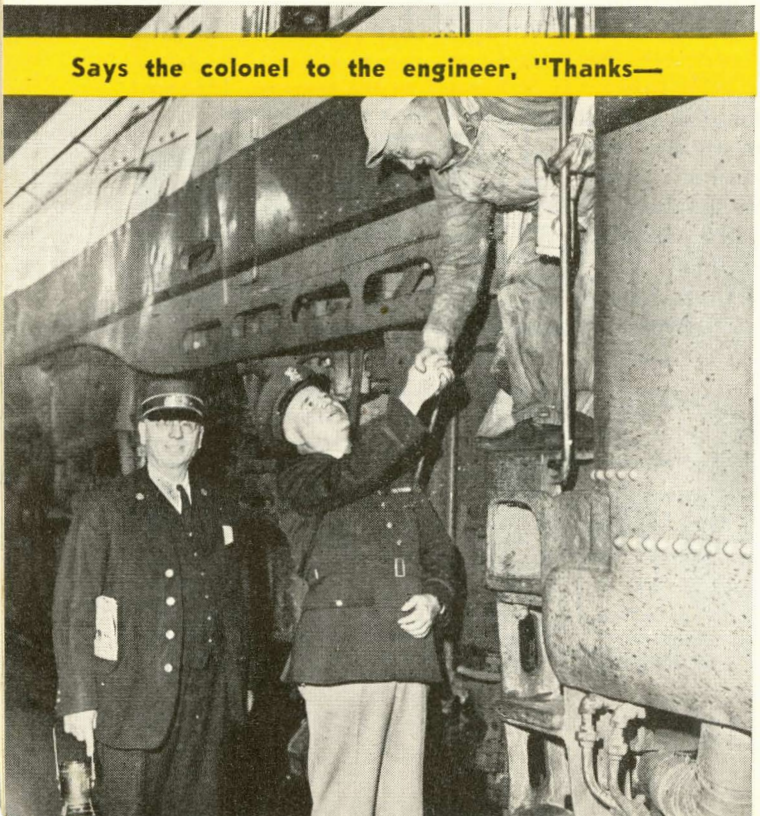
America's railroads, screamed Goebbels, had foolishly been allowed to decline. Now America would pay for this negligence. Her railroads would be swamped under a rising tide of wartime freight and troop movements. Raw materials would not reach the factories, the factories themselves could not be built. Shipyards would lie idle because steel could not be brought to them.

We know now what a bad prophet Goebbels was, but in 1942 American transportation faced its greatest test.



—for moving troops safely and on schedule."

The Iron Horse Went to War



Says the colonel to the engineer, "Thanks—

Burden Put on Railroads

German U-boats were striking a deadly blow at our coastwise shipping. As oil tankers and coal colliers fell victim to Nazi submarines, their vital cargo had to be entrusted to the railroads, an additional burden totaling millions of tons.

Too, the Panama Canal was closed to all but military traffic. This meant that lumber, canned goods, and other freight could not be moved by ship from the Pacific Coast to the East.

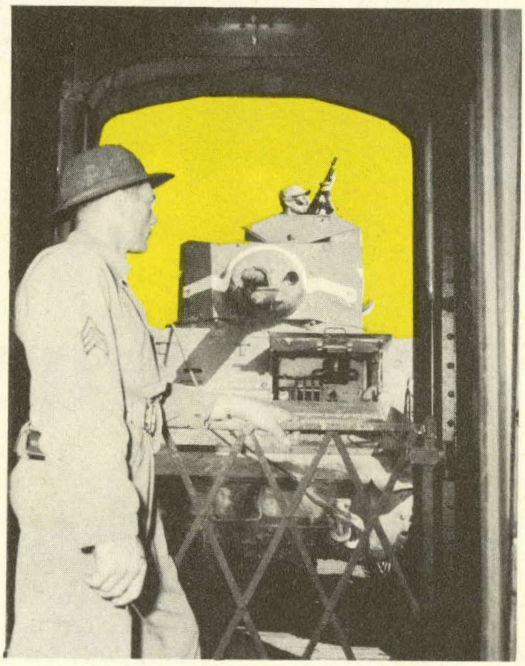
Finally Japanese advances in the Pacific had cut off our supplies of natural rubber. The resultant shortage of tires cut down truck traffic. The American railroads had to transport this added freight.

Responsibility lay heavily on the shoulders of America's railroad men. If the railroads failed, all else would fail. Railroad men said grimly, "Load 'em and unload 'em. We'll move 'em." And they did.

Construction material to build war plants, machines to make guns, ships and planes, the weapons themselves, and the millions of men to fire them, all were moved by rail to where they were most needed.

In the first twelve months following Pearl Harbor, the railroads moved more than 11,600,000 troops, most of them in special troop trains. This was more than four times the amount of troops moved in the first twelve months of World War I! Add to this the many millions of troops on furlough moved by rail, and the figure becomes even more astounding.

By August, 1945, the railroads had transported 43,730,000 members of our armed forces in special troop trains or in special troop cars attached to regular trains! Consider what this means. To move a single army division (15,000 men and their equipment), the railroads have to assemble 500 passenger cars and 3,000 freight cars. Many times, in less than 48 hours, these cars —50 to 70 trains—were speeding toward their destination.



Remember the railroads had to take care of millions of other passengers, as well as mail and express. By 1944, railroad passenger traffic reached the tremendous total of 95,500,000,000 passenger miles. (A passenger mile is the service performed in transporting a passenger one mile.) During this year the railroads carried a little less than 913 million passengers!

But the real battle of transportation was won by the railroad's record movement of freight. The service performed in carrying a ton of freight one mile is known as a ton mile. In 1944, the railroads carried over three billion tons of freight, an average of more than 200 miles—a total of over 730 billion ton miles!

Every minute of the day and night, in fair weather and foul, 17,000 freight trains sped across the plains and mountains of America. Each train carried a cargo equal to that of a good-sized merchant ship.

How did the railroads win the battle of transportation? The answer is simple. The railroads were ready.

In the years between World War I and World War II, the American railroads had spent more than ten billion dollars to modernize their plant, increase capacity, and improve railroad speed, efficiency, safety and service. We had fewer freight cars but they were bigger and roomier. We had fewer locomotives, but those we had were more powerful and could pull heavier loads at faster speeds.

On the Santa Fe and other railroads, fast and mighty Diesel-electric and many new modern steam locomotives were put into service. To meet the greater speeds possible with such locomotives, curves were smoothed out and roadways strengthened. Automatic signal systems were put into ever-wider use.

Yes, the railroads were ready. Before Pearl Harbor, some people criticized the railroads as "old-fashioned" and "inefficient."

But railroad men knew better. They worked quietly, with ingenuity and faith, to make American railroads the best in the world.

When Pearl Harbor came, America's army of nearly one and a half million railroad men and women threw themselves into the battle of the rails. On 400,000 miles of track, railroad workers fought to "keep 'em rolling." A check on a single day's movement of 22,000 freight trains showed that but a few had failed to reach their yards on schedule.

During World War I, railroad transportation suffered because of government confusion and interference. The result was almost a disaster. Near the Eastern ports, loaded freight cars swamped all the sidings because ships were not on hand to take their cargo, and warehouses had not been built. Freight cars were used for storage.

At one time, more than 200,000 cars were tied up in a traffic jam as far inland as Pittsburgh. Finally the government took over the railroads completely. Costs rose by 50 per cent, while tonnage rose only a meager 3 per cent. It was a terrible, bitter lesson.

In World War II the railroads were allowed to do the job under plans made in co-operation with the Army and Navy, the Office of Defense Transportation, the Shipper's Regional Advisory Board, and the Association of American Railroads. The new rule for freight cars was, "Get 'em there, get 'em empty, get 'em back."

With this kind of co-operation the railroads buckled down to their task. Here are the figures that tell the story: railroads carried more than 70 per cent of all the inter-city freight moved during 1944, a peak year. This was almost two and a half times as much as all other carriers combined were able to handle.


Santa Fe