VOLUME XCVII NUMBER SIX

THE NATIONAL GEOGRAPHIC MAGAZINE

JUNE, 1950

Map of Northwestern United States and Neighboring Canadian Provinces

Sixty-four Pages of Illustrations in Color

PUBLISHED BY THE
NATIONAL GEOGRAPHIC SOCIETY
WASHINGTON, D. C.

$5.00 A YEAR 50c THE COPY

VOL. XCVII, No. 6 WASHINGTON JUNE, 1950

THE NATIONAL GEOGRAPHIC MAGAZINE

Montana, Shining Mountain Treasureland

BY LEO A. BORAH

SPACIOUS, vigorous, free and easy, Montana remains the storybook West, embellished but not spoiled by modern development.

It is so close to its beginnings that some of its pioneer settlers are still living. In their childhood buffalo hordes instead of the blooded cattle of today roamed its rolling eastern plains, and Indians strove to drive the white man from their favorite hunting ground by attacking immigrants' ox-drawn wagon trains and by scalping prospectors panning gold along its western mountain streams.

Less than three-quarters of a century ago, June 25, 1876, Custer made his last stand against the Sioux on the Little Bighorn near the place where the town of Hardin now stands, 55 miles southeast of Billings.

The last major campaign of United States troops against the Indians ended on October 5, 1877, north of the Bearpaw Mountains, a few miles from the sites of Chinook and Havre. That day the magnificent Nez Percé Chief Joseph surrendered to Col. Nelson A. Miles after a masterly retreat of 1,600 miles in Idaho, Wyoming, and Montana toward Canada.

A Land of Wide-open Spaces

Nobody is crowded in Montana. With little more than a half-million population, the State has an area of 147,138 square miles—about 180 acres for each person. It measures 545 miles from east to west, 320 miles from north to south, and more than two miles up and down, its lowest elevation 1,800 feet and its highest 12,850. In area third in the Union, it ranks thirty-ninth in population.

So far as is known, the first white men to set foot on Montana soil were the sons of Pierre de la Vérendrye, who visited its eastern plains briefly in January, 1743. They may have sighted the Bighorn Mountains, for their record calls the area the "Land of Shining Mountains."

Lewis and Clark crossed it going and returning on their epic journey to the Pacific, 1805-6, and brought back such enthusiastic reports of its myriad wild animals that it became a mecca for hunters and trappers.

The discovery of gold in commercial quantities in 1862 brought a stampede of miners, but it was not until May 26, 1864, that Montana became a separate Territory. November 8, 1889, it attained statehood.

The Commonwealth that was lawless wilderness 85 years ago is aptly nicknamed the "Treasure State." Beneath its mountains still lies untold mineral wealth, though its mines have already disgorged billions of dollars.

Its farm lands, both nonirrigated and irrigated, produce stupendous yields of wheat, hay, sugar beets, and other crops (pages 722 and 727). Over its grassy hills and plains range thousands of fine cattle, sheep, horses, and hogs. Agriculture has gone far ahead of even mining in money income.

From 25 million acres of forest lumbermen reap rich harvest (page 707). Oil, now produced in many fields, is a source of profit rapidly attaining major development, and natural gas is plentiful in much of the State. In numerous rushing rivers roars unlimited water power.

Glacier National Park, three entrances to Yellowstone, scores of dude ranches, and nine primitive areas invite the Nature lover and sportsman (pages 712 and 728). Annually Montana entertains more than two million visitors. Recreation has become big business.

To begin a trip that was to take me over 6,000 miles of Montana highways and byways,

Ernst C. Peterson

For Bruising Sport, Try Bulldogging a Runaway Steer

Overtaking the steer, the rider leaps from his horse, seizes the horns, digs high heels into the ground and wrestles the animal to earth. The entire action, from the opening of the corral gate to the instant the steer is helpless, is accomplished in seconds. Most Montana towns conduct annual rodeos.

I got off the Milwaukee streamliner *Olympian Hiawatha* at Roundup one day last August.

Roundup, as its name implies, began as a cow town when great herds of stock grazed the open range. With the coming of homesteaders, in 1910, however, the cattle were fenced in. The county-seat town is now a coal-mining center.

Coal Enough for Centuries

According to U. S. Geological Survey estimates, Montana has coal reserves of about 222 billion tons. Much of this, of course, is lignite and subbituminous, too low in heating power and too high in ash content for economical use in industry, but, easy to mine, it holds bright promise for synthetic liquid fuel.

In Roundup I met versatile Bob Fletcher, who seems to know personally most of the people in Montana.

As plans and traffic engineer for the State Highway Commission several years ago, he wrote whimsical legends for the historical markers which add to the pleasure of motorists on 5,000 miles of paved highways. He and I set out together toward the Beartooth Range on the northern border of Yellowstone National Park.

As we drove out of Roundup on a smooth-surfaced road that goes through a gap in the low, massive Bull Mountains to Billings, we were in the wide-open spaces. The August day was hot and sunny, the air so clear that mountains 50 miles away seemed almost at hand. Here and there we passed ranches and herds of cattle or sighted in the distance a coal-mining operation, but we saw few human habitations. Bob pointed out several antelope on a far-off hillside.

At Billings we went up to the summit of the rimrock for a bird's-eye view of the thriving, fast-growing city and miles upon miles of the fertile, widely irrigated Yellowstone Valley.

Ernst C. Peterson

Vacationtime Cowgirl Tries a $500 Saddle in a Miles City Shop

Miles City, a Montana cattle center, offers saddles costing from a few hundred dollars to thousands. Some expensive models are jeweled. Frames and leather parts are wrought by hand. Many working cowboys, rodeo riders, and movie players have saddles made to order.

On a promontory 400 feet above the valley we paused to read the inscription burned on one of Bob's rustic historical markers:

> In frontier days the average party's demise was plumb abrupt and his interment more or less informal. The pioneers, being a vigorous breed, and tough as whang leather, were hard to kill with a 45-90 slug, let alone usual maladies. They regarded pestilence as trivial, and lingering illness due to the ravaging bite of such nefarious critters as microbes and bacilli was practically unknown. So when a gent was called he usually left in a cloud of smoke.
>
> Obsequies were sincere but simple. Whatever eclat they lacked was largely due to shortage of facilities such as pipe organs and rubber tired hacks.
>
> Because of the occupants' habit of fading out in their moccasins, this necropolis has long been known as Boothill Cemetery.

"The site of Billings used to be a favorite camping ground of the Crow Indians," Bob told me. "This trail is named for their Chief Black Otter."

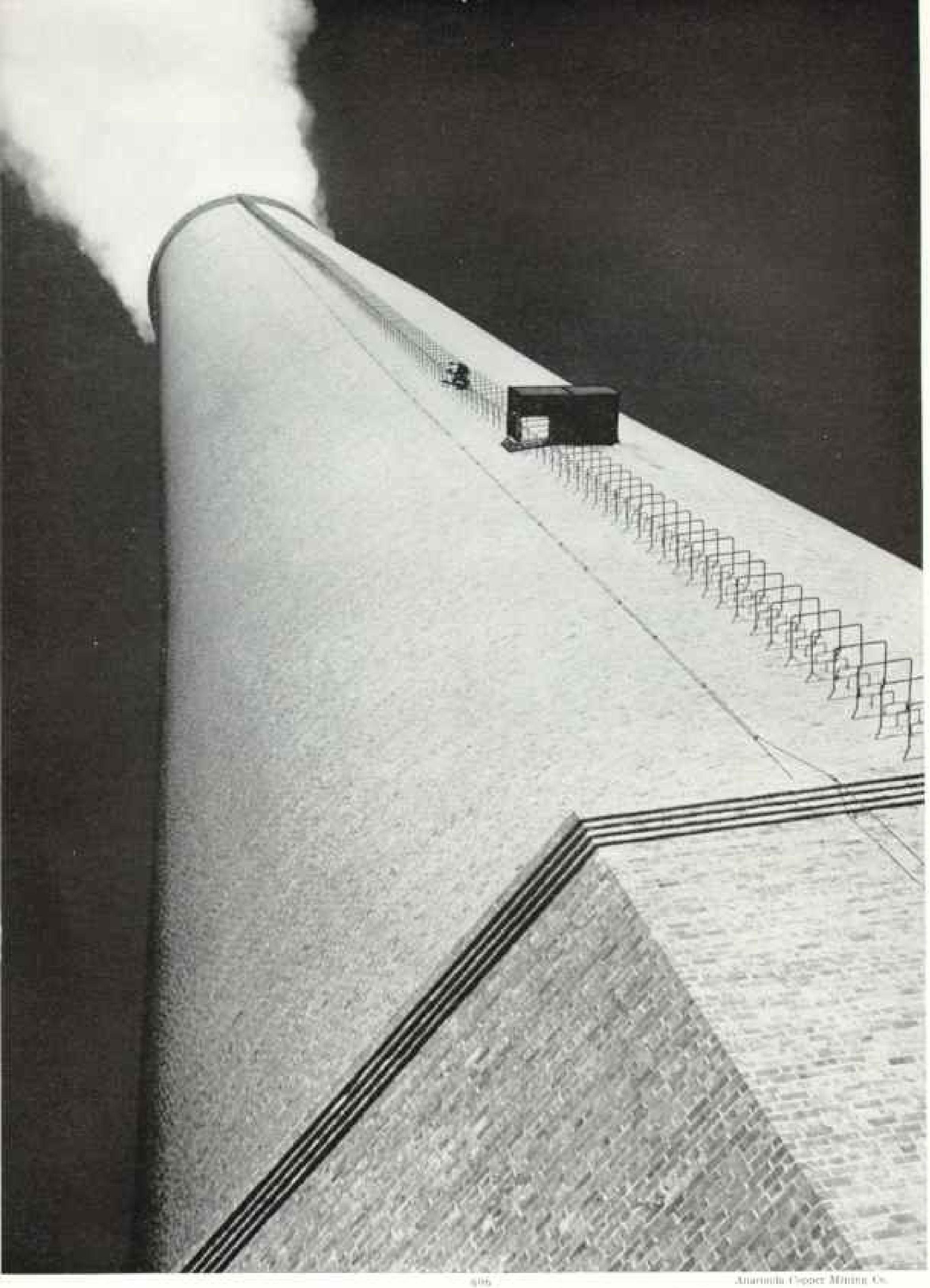
Billings, named for a onetime president of the Northern Pacific, was a rough little cow town of 836 population in 1890. Today, seat of the Eastern Montana College of Education and a booming industrial center, it boasts some 35,000 urban dwellers. Its trade area, embracing the irrigated valleys of the Yellowstone and Musselshell Rivers, is almost as large as the State of Pennsylvania.

Irrigation Has Made Desert a Garden

Since the early days irrigation has been the basis of Billings' prosperity. The first ditch was dug in 1882, and now it is estimated that there are 769,000 irrigated acres in the region of which Billings is the market center.

In 1906 a refinery was built in Billings to produce beet sugar. Beets from 27,000 acres are now processed in this plant, the largest of its kind east of the Rocky Mountains.

In the last decade the handling of crude oil has become a big industry in Billings. Two recently completed refineries are in full oper-



Anaconda Copper Mining Co.

World's Largest Smokestack Carries Off Fumes from Anaconda Copper Smelters

This brick chimney soars 585 feet (page 709). At scheduled intervals inspectors climb the steel ladder to the top. In a stiff wind, they say, they can feel the great column swaying.

ation, with an annual production of more than 30 million dollars.

As in the days when the Yellowstone Basin was untilled grassland, Billings still is in the livestock business. Working cowboys, wearing "ten-gallon" hats and high-heeled boots, but easily distinguishable from dude visitors affecting similar garb (page 699), mingle with the crowds on the streets.

Newspapermen from all over the State were gathered in Red Lodge for the 64th annual meeting of the Montana State Press Association.

Journalism in Montana has a dramatic past. The first real newspaper, the Republican weekly *Montana Post*, was started in Virginia City in 1864 by two adventurers who brought their equipment from St. Louis to Fort Benton by steamboat, hauled it with ox teams to the booming gold camp, and set it up in a cellar under a cabin.

When the opening issue came off the press, its 960 copies sold quickly for 50 cents each in gold dust. The partners printed just two issues and sold out for $3,000, but the paper went on until 1869.

In the 1890's, when the rival copper kings Marcus Daly and William Andrews Clark were fighting for supremacy, each owned or controlled influential publications throughout the State. Daly's personal organ was the *Anaconda Standard*, Clark's the *Butte Miner*.

Early Editors Used Harsh Epithets

With utter disregard of libel laws, the editors battled hammer and tongs. Daly backed Anaconda for the State capital; Clark, Helena. A Clark paper, the *Missoulian*, charged that Daly forces were hiring Pinkerton detectives to register voters for Anaconda illegally. The *Montana Silverite*, the Daly supporter in Missoula, retorted by calling Helena "Her Hogocracy of Last Chance Gulch."

Montana now has 113 newspapers, 17 of them dailies, but editorial blunderbusses are no longer fired. At the Red Lodge meeting the editors fraternized happily, exchanging ideas on ways to improve their papers.

Red Lodge, at the foot of the Beartooth Range, grew up as a coal-mining town, but since completion by the Federal Government of the $2,755,000 Red Lodge-Cooke Highway it has become a summer resort.

While our newspaper friends were in business session, Bob and I drove 70 miles over the safe, paved road to the Silver Gate entrance to Yellowstone Park and back.

The ride was one of the most thrilling in my experience. Not far from the town the road enters narrow Rock Creek Canyon and ascends steeply between sheer cliffs into Custer National Forest.

Thence by four tremendous switchbacks it rises in 16 miles to an altitude of 10,942 feet, well above timber line. Great peaks rear skyward in every direction, some heavily forested, some crowned with eternal snow.

At Beartooth summit on the Wyoming side of the ridge we looked toward the northwest to see 12,850-foot Granite Peak, highest mountain in Montana, thrusting its snowy crest above clouds. Below and all around our eyrie spread out a glorious panorama of forest, lakes, mountains, and plateau meadows, dappled here and there by fleeting shadows as small clouds drifted across the sun. I marveled to think as I gazed over the seemingly impassable terrain that Chief Joseph and his little band had gone through it in their famous retreat.

Early the next morning we went back to Billings, intending to engage rooms there for the night and make a trip to the Custer Battlefield. Billings and Salt Lake City baseball teams were to play a championship game that night, however, and every lodging place in town was overcrowded. We headed west.

A "Saddle and Go" Horse Race

At the fair grounds in Big Timber cowboys, riding ranch horses, were competing in a novel "Saddle and Go" contest, changing mounts three times in the course of a race. After every round of the half-mile track each rider would take the saddle off his mount, put it on the next one, and dash away in a cloud of dust. A young Indian from a dude ranch won the opening race in record time.

Near Big Timber at the foot of the Crazy Mountains the first dude ranch in Montana was started about 40 years ago. That was the beginning of a resort business that, now statewide, attracts thousands of summer vacationists.

In the early days of water-power development, Big Timber electric lights were operated by power from a dam built across a small ditch connected with the Boulder River.

A circus came to town one day and pitched its tents near the ditch. That evening the circus tents were well lighted with gasoline flares, but all the electric lights in the town flickered and went out. The circus elephant, taking a bath in the power ditch, had blocked out the water.

Nothing like that could happen today, thanks to the 12 plants of the Montana Power Company, and some installations of the Montana-Dakota Utilities Company. All Montana is furnished with abundant electricity.

U. S. Army Official

Fort Peck Dam, Which Plugs the Missouri River, Is Crowned by a Brilliantly Lighted Highway 50 to 100 Feet Wide

This earthen dam, largest of its kind in the world, rises a maximum 250 feet and spreads out 4,900 feet at the base (page 733). It is 21,026 feet long. Four mile-long diversion tunnels are controlled by machinery in buildings on the left. Its generators can produce 50,000 kilowatts.

Ray J. Manley from Western Ways

Combines, Sailing a Golden Sea of Wheat, Leave 18-foot Wakes on the Vast Campbell Farm near Hardin

Northern Pacific Railway

An Eastern "Dudine" Gets the Western Look

As a ranch hand adjusts her chaps, the visitor fancies herself a real cowgirl. How she will feel after she has been in the saddle a few hours depends on how much riding she has done previously.

Walt Dyke from Great Northern Railway

"How Do You Talk with Sign Language?"

A boy from the East gets a lesson in Indian conversation from one of the Blackfeet who greet visitors at Glacier Park station (page 708). In the Plains Museum at Browning are displayed relics of the warlike Blackfeet.

Even the demands of war at its peak did not necessitate a brownout, and excess power was transmitted to Utah, Idaho, and eastern Washington.

When we reached Livingston, we were held up for ten minutes by a saddle-club parade. Livingston is the outfitting point for a vast recreation area and for travelers bound for Yellowstone National Park by way of the Livingston-Gardiner route.

All about Livingston mountains hem in the highway—the Absarokas, the tall Crazy Mountains, and the Bridger Range, named for the most famous of pioneer guides. John M. Bozeman, who vied with Jim Bridger in a race to prove a short-cut trail to Virginia City in the 1860's, was killed by Indians a few miles east of Livingston. His body now rests in the city that bears his name.

At Bozeman is Montana State College, oldest active unit of the University of Montana. The campus of 95 acres accommodates the college, a field office of the U. S. Bureau of Entomology and Plant Quarantine, the Agricultural Extension Service, and the State Agricultural Experiment Station.

Like Livingston, Bozeman is a recreation center (p. 704). The Bozeman-Gallatin Canyon route is one of the main roads to the West Yellowstone entrance to Yellowstone Park.

Where the Mighty Missouri River Begins

East of the town of Three Forks we made a short detour to the point where the Missouri River has its beginning. We scrambled up to a height from which we could see the Gallatin, Madison, and Jefferson Rivers meeting to form the Missouri.

In gathering dusk Bob and I rode into Butte, the unique city that copper has built on the slope of "the richest hill on earth" (page 703). That hill has yielded, since its discovery 86 years ago, about three billion dollars worth of metallic and nonmetallic minerals. On its surface are some 250 miles of streets, in its depths nine times as many miles of mine tunnels.

In May, 1864, miners from the Virginia City camp found placer gold along Silver Bow Creek (now Clark Fork) in the valley below the hill which has made Butte famous. A tent town sprang up quickly, only to fade into a ghost camp in 1869 when a water shortage put an end to the placer mining.

In 1875 William L. Farlin, an Idaho prospector, quietly staked claims on outcrops of quartz near the abandoned diggings. The black ledges proved rich in silver, and overnight Butte became a wild boom town, with claim jumping and pistol fights common.

W. A. Clark, Deer Lodge banker who later became U. S. Senator, built a stamp mill to handle the ore. The narrow-gauge Utah and Northern Railroad was constructed in 1881 to transport the silver ore to the main line of the Union Pacific at Ogden, Utah. Other railroads came later, the Northern Pacific, Great Northern, and Milwaukee.

Marcus Daly Built a Copper Empire

Attracted by the excitement, a young Irishman, Marcus Daly, came to Butte to work a silver mine for some Salt Lake City bankers. His operations were fairly successful for a while, but the owners lost interest when instead of silver he began to strike copper.

Though experts laughed at him, he borrowed money to develop the Anaconda mine and at 400 feet opened up a fabulously rich vein of copper 50 feet wide. That was the beginning of Butte as the capital of a copper empire and of a feud between Daly and Clark that had national repercussions.

Daly, two years before his death in 1900, sold out his interests for 39 million dollars. Clark died in 1925, one of the wealthiest men in the United States. Both he and Daly had started out with nothing.

Eager to see a copper operation from the beginning, I asked officials of the Anaconda Copper Mining Company to take me down into a mine. They suggested one of the regular visitors' sight-seeing trips, but I fatuously insisted on going with a work shift. A young mining engineer volunteered to conduct me.

Where gigantic steel headframes bristle above the numerous mine shafts, we entered a locker room in the office building of the Leonard mine.

There my companion stripped and put on work clothing. He got out a similar outfit for me, and I dutifully donned it—all save the long woolen underwear, the mere sight of which always makes my skin itch. I had a pair of thick wool socks, oversize overalls and jumper, and gum shoes so huge that my feet slid around in them when I walked.

To top off the ensemble, the supply clerk fitted on me a strong fiber helmet surmounted by an electric light from which a thick cord led to a battery firmly anchored to a wide belt around my waist. The cord was a bit short, and I couldn't turn my head without jerking the helmet awry. This difficulty I expected to overcome by turning on my heels when anybody spoke to me from behind or at the side.

The work shift was ready to go down in the four-decked elevator—capacity eight men to a deck. My companion was rather small,

Kodachrome by Ernst Peterson

King of the Crags, a Rocky Mountain Goat Surveys His Montana Wilderness Domain

Some 4,000 of these acrobatic relatives of the antelope survive in high fastnesses of the Selway-Bitterroot Wilderness Area (above) and Glacier National Park. Incredibly sure-footed, they scale seemingly vertical cliffs.

Engraving by Ray Atkeson

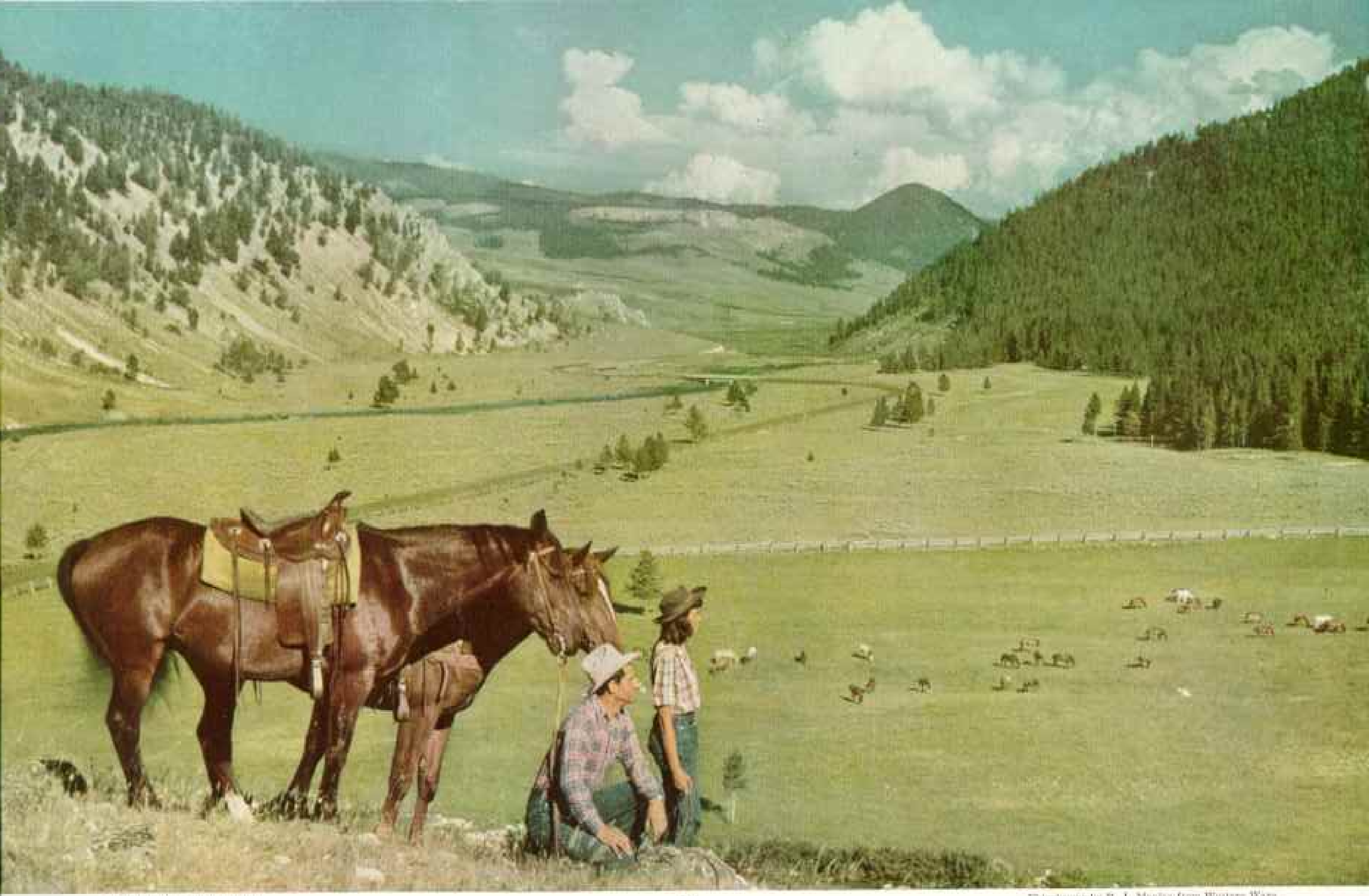
Copper, the Metal That Made Montana Rich, Fittingly Sheathes the Dome of the State Capitol in Helena

A statue (left) commemorates Thomas Francis Meagher, once acting Territorial governor. A native of Ireland, he served as a general in the American Civil War.

Butte's "Richest Hill on Earth" Has Yielded Minerals Worth Nearly Three Billions; 2,280 Miles of Tunnels Honeycomb Its Depths

Though bonanza days are gone, the hill is still a heavy producer; engineers say it is good for decades to come. Discovered in 1864 by placer miners, the strike was abandoned within a few years when water failure stopped the washing of gold. Later a silver discovery started a frenzied boom shared by claim jumpers and gun fighters. Next a fabulous vein of copper launched the Marcus Daly fortune. Left: the buildings of the Neversweat, Anaconda, Mountain View, and St. Lawrence mines, all famous in early days. Right: a miner "bars down" loose material lest it fall and cause injury. The vein of pink manganese contains dark bands of zinc.

Kodachromes by Willard R. Culver



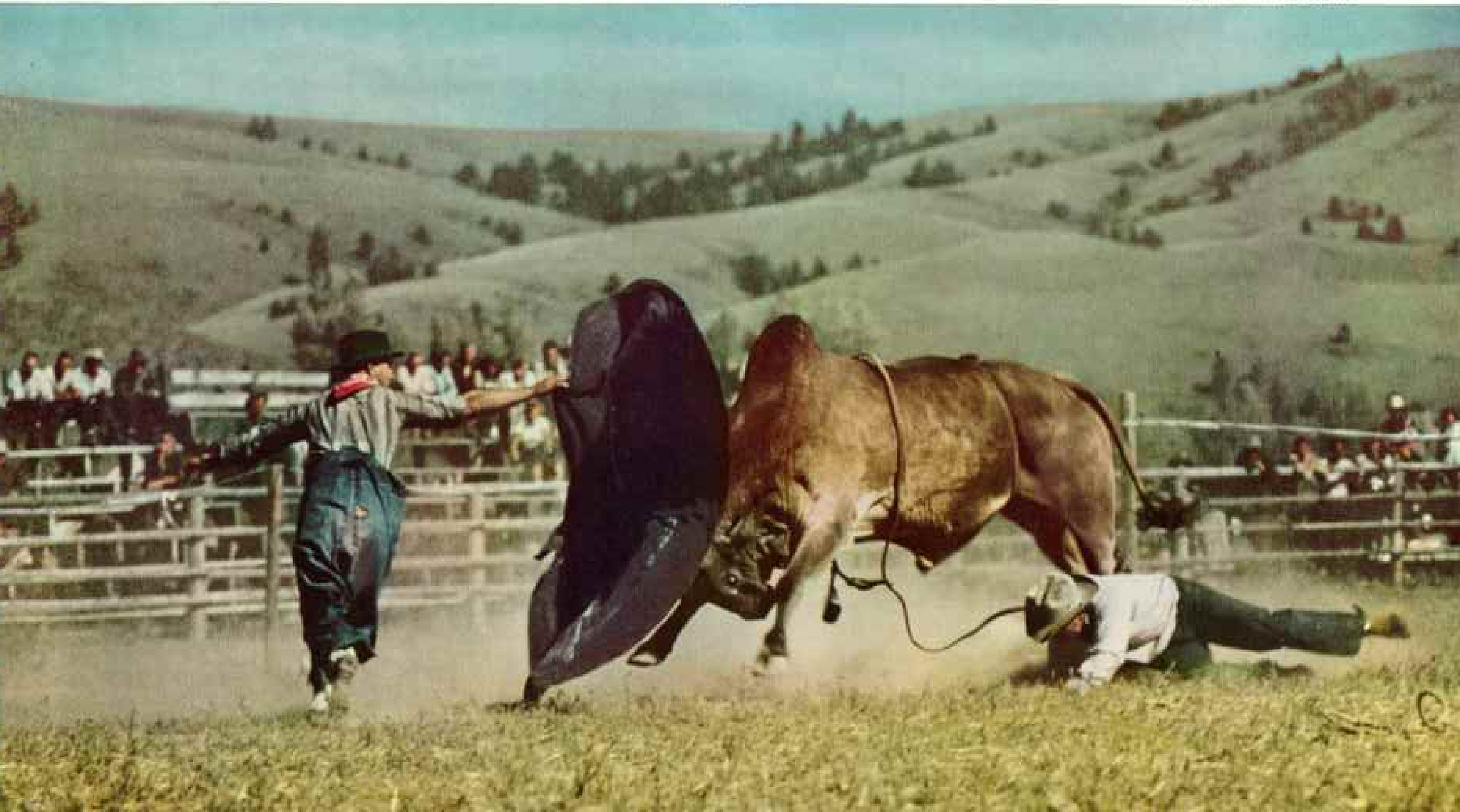
Ekjarhamar by R. J. Mauler from Western Ways

Brahma Bull Tosses His Rider at Darby Rodeo; Tattered Clown Waves a Blanket in Mock Defiance

Montana remains the storybook West. Its year-'round cowboys are as genuine as saddle leather, but the summertime variety ride desks for a living. The State's first dude ranch, started 40 years ago, now has scores of imitators. These, together with the scenery, account for two million visitors a year. Darby, Billings, Miles City, Dillon, and virtually every other town in the State has its rodeo. Riders and clowns, following these shows in circuit, risk broken limbs and stepped-on heads for cash.

Opposite page: vacationists enjoy a view of Elkhorn Dude Ranch near Bozeman.

Kodachrome by Ernst Peterson

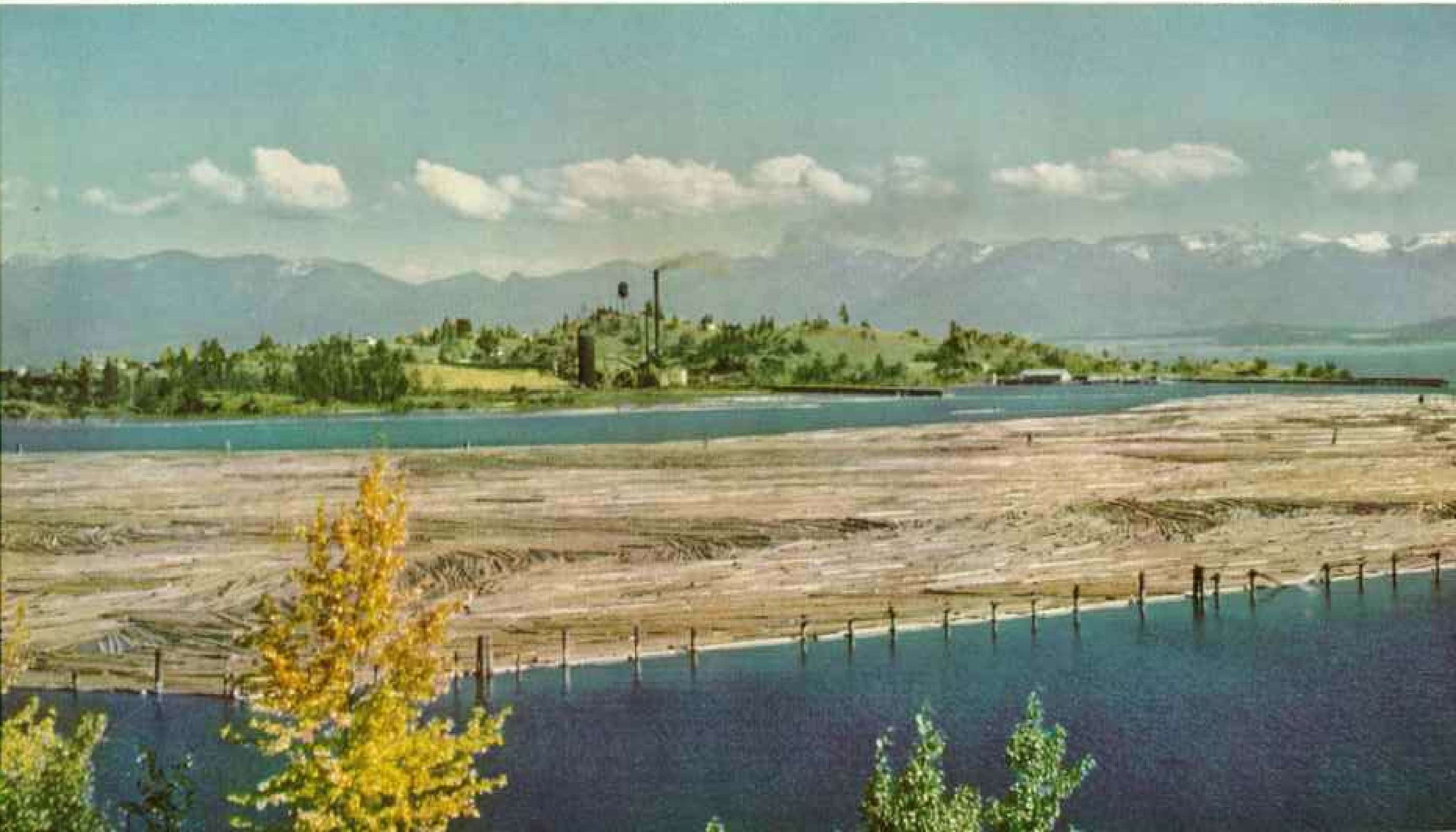


Below the New Chair Lift at West Yellowstone, Montana Stretches out Like Earth Seen from a Rocket

Anaconda in 1934 started the State's winter-sports craze with construction of a ski jump, one of the nation's fastest. Today ski courses lie within easy reach of almost every town. In 1949 national championships were run on Big Mountain, near Whitefish. High peaks hold good snow even in summer.

Flathead Lake, One of the Largest West of the Mississippi, Carries Log Booms to a Lumber Mill at Somers

Forests cover some 25 million acres, a fourth of Montana. About a fourth of this area is worked; the rest protects valuable watersheds. Ponderosa pine, Douglas fir, and western larch are cropped regularly. Lodgepole pine has gone into railroad ties since the first train crossed the Rockies.



When Earth Writhed Eons Ago, Glacier Park Strata Buckled

Lewis overthrust fault, beginnings of which are seen here, is the result of an upheaval which shoved older rock 15 to 25 miles across newer formations. Sperry Glacier, which shows the edge of its snowfield, is one of 60 ice rivers for which the park is named.

Blackfeet Indians in Tribal Regalia Sell Postcard Pictures of Themselves

Weasel Feathers, Lone Rising Wolf, and Middle Calf meet each train at Glacier Park station. They are employees of the Great Northern Railway, whose line, completed in 1893, opened this scenic area to travelers. Members of the tribe started the custom years ago.

but our cage, the top one, was pretty tight with only seven passengers.

Doors clanged shut, a bell sounded, and down we dropped at breathless speed to the 3,100-foot level.

No Place for a Mollycoddle

There we got out, and a mine foreman with the agility of a mountain goat led us through a tunnel to the foot of a stope where a huge cascade of ore had just been blasted from the wall. The foreman swarmed up a ladder and I lumbered after him.

When I got to the top of the ladder, the foreman called out from somewhere behind me, "Come over here."

I planted my gum shoes precariously on the ore pile and inched around to see him ten feet away beyond a horizontal log that would have to be scaled at risk of life and limb.

Completely winded, I gasped, "I hate to be a mollycoddle, but I can't make it."

We climbed down to the tunnel floor, and after I had recovered my breath walked what seemed a mile to the foot of another stope. The going along the ore train tracks was uneven and a little slippery in spots, but I got along fairly well save when my helmet collided with the large canvas ventilation tube suspended from the tunnel roof. Once we huddled into a safety corner while a long train of ore cars rumbled by.

I climbed another ladder and, with the aid of my acrobatic guide, clawed to the top of an ore pile. Men with pneumatic rock drills were working on the walls of the stope.

Back at the elevator station, a work shift was waiting to go up.

"Whew!" I said to the engineer when the elevator whisked back to the surface and we got out of the cage. "What a tough way to earn a living this mining is!"

The foreman bridled. "I like it; my father and grandfather both worked here and liked it. It's not hard after you get used to it."

With the embarrassed feeling that I had given the miners a good laugh, I clop-clopped over to the supply room to surrender my torturing helmet.

There are 14 hoisting shafts on the Butte Hill and 30 shafts for ventilating and servicing the operating areas. To insure safety, all the mines are connected by underground passages, and in case of accident in any one of them the workers can walk to another and ascend to the surface.

Relieving men of much of the backbreaking toil of former years, power-driven scrapers and mucking machines are employed. The mines use 50,000 horsepower of electricity supplied by the Montana Power Company, a concern entirely independent of the Anaconda Copper Mining Company. Between the two the only connection is that the mines are the best customers of the power producers.

That night Bob, Mrs. Fletcher, and I went to the Italian settlement in Meaderville for dinner at "Teddy's" Rocky Mountain Cafe. The meal, perfectly cooked, and made particularly tempting by an array of unusual hors d'oeuvres, was a gourmet's delight. When my stupendous tenderloin steak was set before me, I heard a guest at the next table ask a waiter, "What is that, a roast?"

Teddy came to this country from Dalmatia years ago as a penniless boy. He has lost two or three fortunes and has always come back to make another.

The next morning I went to Anaconda to see some of the ore I had watched mined in the Leonard go through the smelter.

Years ago when copper was smelted in Butte, the air all over the city was so thick with sulphur fumes from low-surface roasting and furnace chimneys that street lights had to be turned on in daytime, and not a spear of grass could live except under glass.

Now the smelters are located on a hilltop in Anaconda, 25 miles away, and the fumes from the furnaces are carried off with little harm to vegetation by the largest smokestack in the world—585 feet high (page 696). Trees, grass, and flowers are gradually covering the once barren landscape in Butte.

Copper Ore Taken for a Ride

Superintendent Charles A. Lemmon showed me through the huge Anaconda Reduction Works.

At the top of the hill we watched steel cars full of ore tipped bodily so that their contents fell roaring into a hopper of 200-ton capacity. From a gargantuan crusher below this the ore emerged in lumps not more than four inches in diameter. A second crusher, working like a coffee grinder, then reduced the four-inch pieces to one-inch diameter.

Now the small bits of ore went into churn-like ball mills and a series of roller crushers which pulverized them to the fineness of flour.

By mechanical means the powdered ore, still 80 per cent waste, was carried into chutes of running water, called launders, to flotation machines where it was agitated and aerated with oils and chemical compounds.

This process seemed to me to make the law of gravitation operate upside down, for the heavier, valuable minerals, attracted by the oil and chemical bubbles, floated to the surface, and the lighter, waste material sank to the

bottom. The flotation equipment at Anaconda takes 14,600 tons of crushed ore for a ride every 24 hours.

Concentrated now to 20 per cent of its original volume, the powder went into roasting furnaces which burned off excess sulphur and other harmful elements, leaving calcine. The calcine, sent into reverberation furnaces, emerged as matte, a mixture of copper, iron, and sulphur, together with some traces of silver and gold. The slag from the reverberatory furnaces was thrown away.

At this point began the most spectacular operation I saw. The matte was heated to a fiery liquid in huge potlike axle-mounted converter furnaces and poured out as blister copper, 98 per cent pure.

Still containing small amounts of impurities, the copper was cleansed further in refining furnaces and finally cast into 740-pound anodes, rectangular slabs provided at the top corners with protruding ears needed for hanging them on parallel supports in electrolytic refining tanks.

The anodes were loaded into steel railway cars and hauled to the electrolytic copper refineries at Great Falls. They still contained small amounts of gold and silver, to be removed during the electrolytic process.

Men Vie for Jobs in the Arsenic Plant

Zinc from the Butte mines as well as copper is processed at Anaconda, and one mill handles large quantities of arsenic, which is found with the metals. When Mr. Lemmon showed me masked men working in the arsenic plant where the poisonous white powder coated everything, I was astounded.

"Isn't that a dangerous job?" I asked. "I always have thought arsenic is absorbed by the skin and eventually causes death to any person who is exposed to it constantly."

"These men all cover themselves with protective ointment," he replied. "They get extra pay, and there is a long waiting list for the jobs. So far as I know, none of them has ever suffered from arsenic poisoning.

"Butte mines provide not only arsenic but more than 95 percent of the domestic supply of manganese ore. We concentrate the pink-colored ore here, and the concentrates are roasted in a big rotary kiln to produce the high-grade manganese nodules vital to the production of steel."

After the trip through the Anaconda Reduction Works we had luncheon in the old Montana Hotel. A lounge there is furnished in the style of the gay nineties. Inlaid in the floor is a likeness of the head of Marcus Daly's race horse Tammany.

When Tammany ran, the miners, who had fanatic faith in the Irish copper king's luck, would bet on the horse every cent they could raise. Tammany seldom failed them.

A Land of Blood and Thunder

Leaving the copper country for a while, Bob and I drove south to Virginia City, heart of the district once famed as a land of gold. This is the cradle of Montana, a town with a history more melodramatic than a blood-curdling dime novel. State Senator Charles Bovey is restoring the old town, and once again it looks much as it did in the 1860's (page 732).

Rich placer deposits discovered about 1862 on Grasshopper Creek brought a stampede of prospectors bound originally for the Salmon River country in Idaho, and the town of Bannack sprang up with a population of 500 in a few days. Though for years Bannack has been a well-nigh effaced ghost town, it is remembered as the first capital of Montana Territory.

For almost a year Bannack was the most important placer camp east of the Continental Divide, but in May, 1863, it lost its supremacy and most of its population in one night. Intrepid William Fairweather and five companions had struck a bonanza in Alder Gulch, 55 miles distant!

Within a year there were 4,000 people in Alder Gulch. The community was organized and named first Varina for the wife of Jefferson Davis. A Republican judge, however, refused to certify the name and registered it as Virginia City.

In 1865 the Territorial capital was moved here from Bannack, to stay until it went finally to Helena in 1875. More than a hundred million dollars in gold was taken from Alder Gulch and vicinity.

The Sheriff Was the Robber Chief

Under the wily leadership of genial Henry Plummer, who had been elected sheriff at Bannack, a band of desperate outlaws terrorized the district for months, robbing stages of consignments of gold dust. These road agents murdered more than 100 persons.

Finally the honest citizens formed a vigilante organization. The vigilantes captured and hanged 28 of the miscreants, the false sheriff included, and drove out the rest. Five were hanged in one day at Virginia City. On Boot Hill Cemetery five markers were erected, each bearing merely a name and the one-word epitaph, "Hanged."

When a criminal was hanged, equipment was simple—a convenient tree or building

U. S. Forest Service

A Smoke Jumper Dropped from a Plane Parachutes into a Forest Fire

Crews of 10 to 15, responding to Montana alarms, are airborne within 20 minutes. This jumper steers his 'chute by pulling lines which open and close slits in the canopy. His 60-pound kit contains such items as ax, saw, shovel, rope, drinking water, and emergency parachute (page 734). At the Dillon rodeo last fall a jumper landed accurately in front of the grandstand after a 5,000-foot leap.

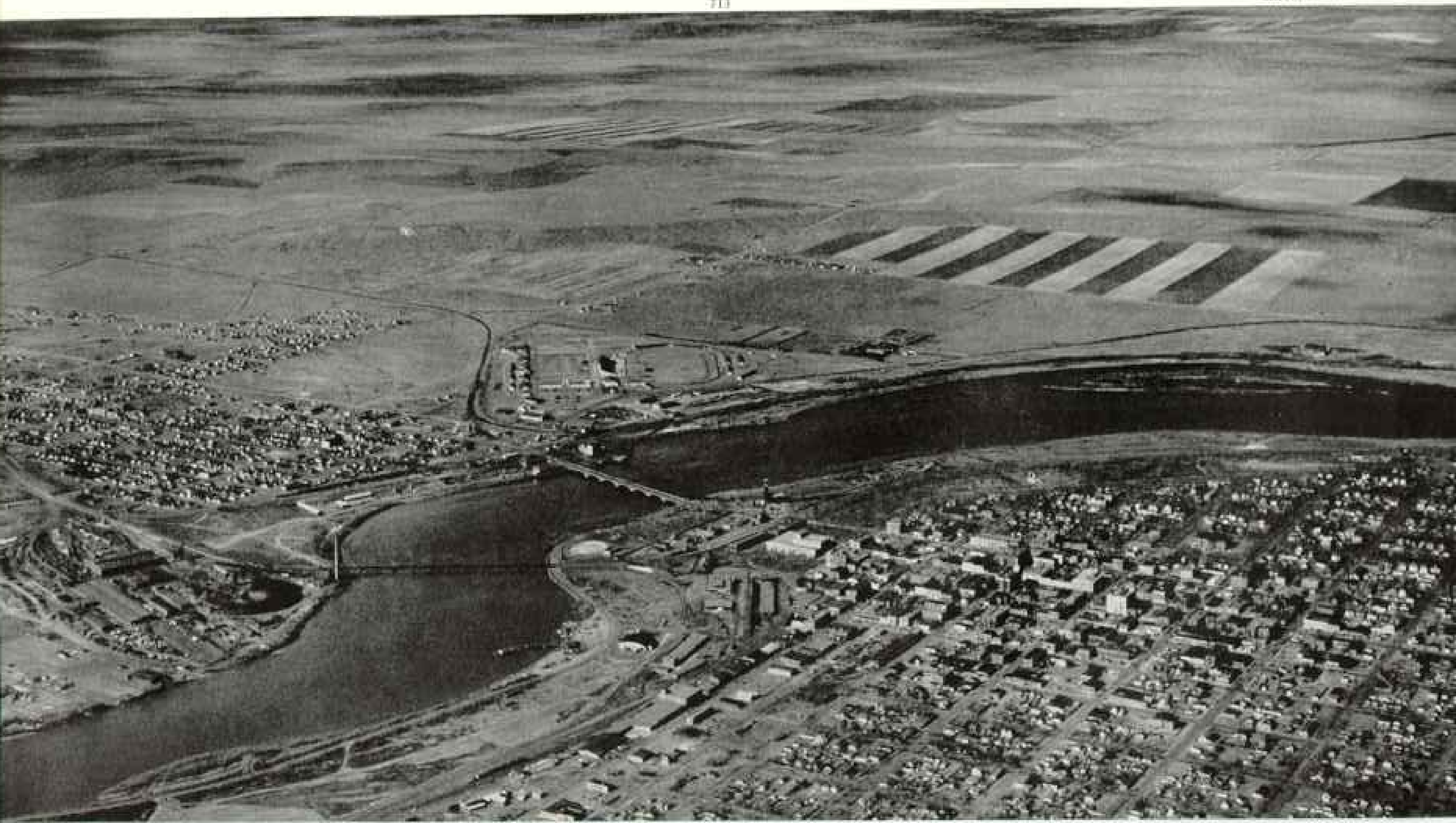
Ray J. Manley from Western Ways

The Sight of Elk Moving Casually Across Hill and Snow Thrills Eastern Visitors. It's an Old Story to Their Ranch Guide

When winter snows drive wild herds down from the mountains, resort towns such as Bozeman and Livingston are thronged with sportsmen during the open season.

Great Falls Puts the Mighty Missouri to Work; Its Prairie Hinterland Is Striped with Wheat Farms

Lewis and Clark saw this area crowded with bison. To get their boats around cataracts in the river, they toiled 13 days. Now the roaring rapids (not shown) turn four big power plants. Strip farmers plow up only half their wheatland, allowing alternate strips to lie fallow for a year. This method prevents erosion, preserves fertility, and combats drought. When winds sweep across, dust settles into the unbroken strips, instead of blowing away; grass-covered land catches and holds moisture.



rafter, a lariat rope, and a barrel or a horse's back for a platform. One "Whisky Bill" Graves, on the noose end of a rope thrown over a high cottonwood limb and then attached to a rider's saddle horn, was seated forcibly behind the rider.

"Well, good-bye Bill," the rider called out, and set spurs to his mount.

Bob pointed out many places of interest in Virginia City, among them a famous claim called "Bummer Dan's Bar." Bummer Dan McFadden was a lazy fellow who lived on handouts in the boom camp until the miners grew weary of feeding him and ordered him to stake a claim and go to work.

When he complained that all the likely ground was taken, they showed him an open tract on the creek bank and made him start digging. Bummer Dan's bar turned out one of the most productive claims in the camp, yielding $5,000,000!

Even now there is some quartz mining near Virginia City, though the town has other means of income. Visitors who come to see the restoration are bringing on another boom. In the Wells Fargo Coffee House up the street from the old Bale of Hay Saloon, Bob and I were lucky to get reservations for a smorgasbord, really a colonial-type buffet supper, which seated 300 customers and turned away as many others.

"Cabaret" entertainment was supplied by a company of talented young players dressed in costumes of the gay nineties. Two or three nights a week they put on melodrama without any attempt at travesty.

Helena Began as "Last Chance Gulch"

Helena, Montana State capital, had its beginnings in Last Chance Gulch, a mining camp almost as riotous as Virginia City. Today Last Chance Gulch is Main Street, and the Montana Club building, which also houses the Chamber of Commerce, has on its wall a plaque marking the spot where the first gold strike was made.

Four discouraged prospectors who found a few "colors" in a creek here in 1864 thought at first the place was hardly worth investigating. Disgustedly dubbing it their last chance, they roamed all over the barren Prickly Pear Valley and equally desolate surrounding hills in search of more promising ground. They found nothing good, however, and in desperation returned. The strike they made was one of the richest in history.

The old-timers' expression, "There's gold in them thar hills," is still true in Helena. A Spokane company recovered thousands of dollars only two years ago by operating a dredge near town, and during depression years men digging for gold with picks and shovels in vacant lots within the city limits eked out a living.

When the Placer Hotel was built, the contractor recovered enough gold from the basement excavation to pay for the foundation—some say for the whole structure.

Stories of fabulous early-day strikes in the district are legion. Here Tommy Cruse, a ragged Irish immigrant, prospected in the hills for nine luckless years, often begging money to buy food. At last in 1876 a grocer and some schoolteachers grubstaked him, and he found and named for his home in Ireland the incredibly rich Drumlummon mine.

Now the lush days of mining are over, and Helena depends upon cattle and sheep raising, agriculture, hydroelectric power, and manufacturing for most of its income. A magnificent new building houses the Federal Reserve Branch Bank.

Silver Dollars Cause a Bank Emergency

In Montana dollar bills are seldom seen; change from a $5 note offered in the purchase of a 10-cent article being invariably 90 cents in small coins and four silver dollars. The president of the Federal Reserve Branch Bank told me why.

"Montana is a silver State," he said, "and the citizens like silver money. We handle 200,000 silver dollars in this bank every week, and they come in bags holding a thousand each and weighing 64 pounds.

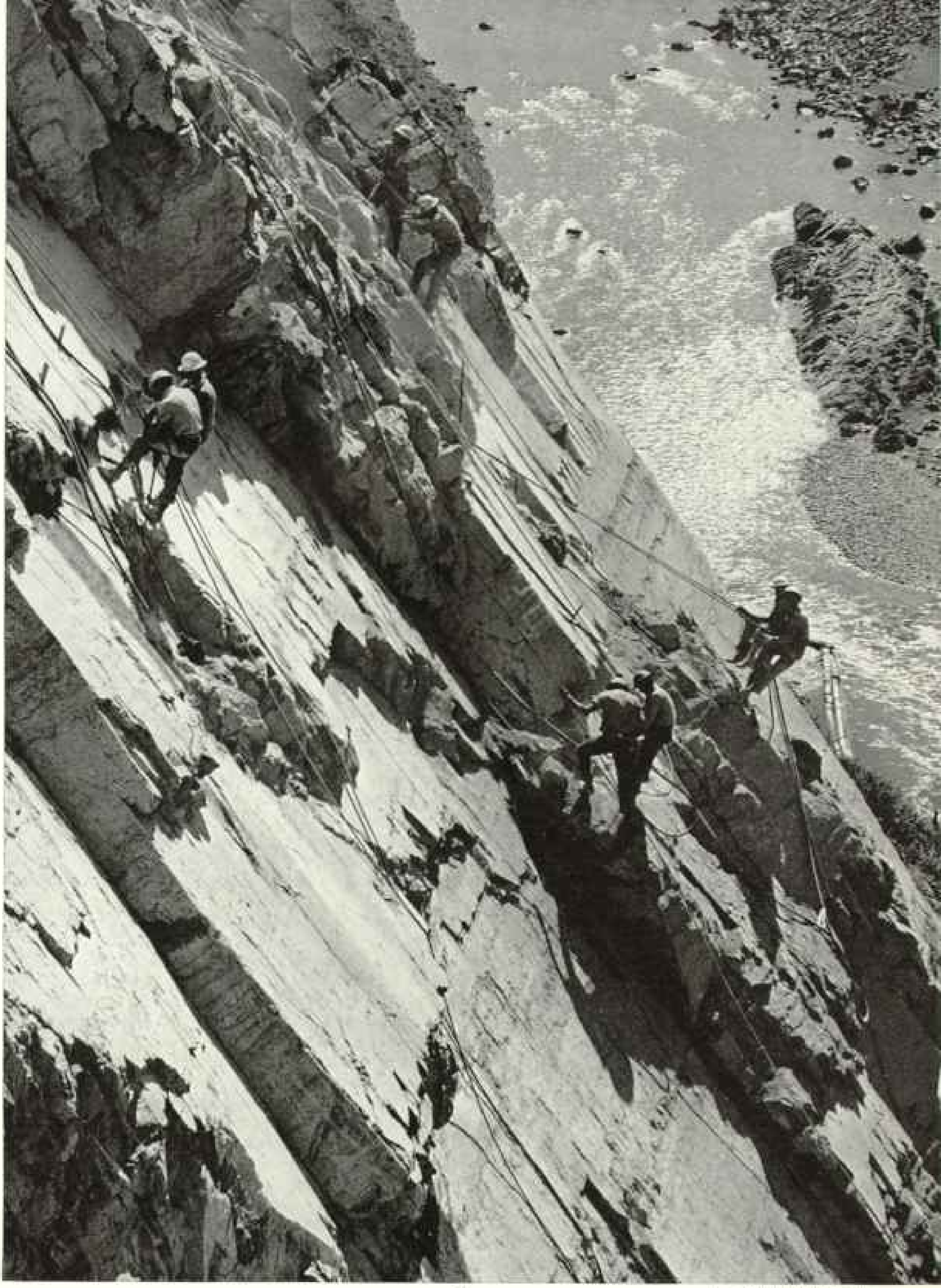
"During the war most of our men clerks were away in the services, and girls had a terrible time handling the silver. Every bag has to be lifted eight times after it is delivered from the mint.

"I appealed to the public to use paper dollars during the emergency.

"The only result I got from my posters was sharp criticism. Some critics even went up and down the State campaigning against me with charges that I was trying to demonetize silver."

Next to mining, the production of livestock is the oldest industry in Montana. Cattle were introduced to the Bitterroot Valley in the 1840's, and after the opening of the famous Chisholm Trail to Kansas in the late 1860's hundreds of thousands of Texas longhorns were trailed into Montana by cowboys. Sheep were brought in about the same time.

On January 1, 1950, there were in Montana 1,731,000 cattle valued at more than 221 million dollars (page 724); 1,735,000 sheep worth about 33 million; 153,000 horses; and 192,000 hogs. Total value of all livestock in the State



U. S. Bureau of Reclamation

Mountain-climbing Jackhammer Crews Drill the Canyon Wall at Hungry Horse Dam Site

The world's fourth largest concrete dam is rising on the South Fork of Flathead River at a cost of $108,800,000. These drillers, suspended by safety lines, bore holes for dynamite blasting.

was estimated by the U. S. Bureau of Agricultural Economics at $264,012,000.

From E. A. Phillips, secretary of the Montana Stockgrowers Association, I learned something of the history of the cattle business. The association was organized in Miles City in 1885 to provide united action in enforcing livestock laws, protect ranchers against organized bands of rustlers, and guard ranges against fires.

Miles City, named for Nelson A. Miles and still redolent of the Old West, came into being as a camp on the Texas trail within striking distance of the Black Hills gold camps. In the heart of a famous cattle country, it is a hearty survivor of cowboy days, renowned for its saddleries (page 695).

Old Fort Keogh, up the Yellowstone from Miles City, was established not long after the Battle of the Little Bighorn and named for Capt. Myles W. Keogh who died with Custer. Here for many years the U. S. Army maintained a famous remount station.

The beginnings of the Stockgrowers Association were in the days of the open range. Very active in the young organization was Theodore Roosevelt, who became a member on April 3, 1885. Cattle rustlers were raiding herds everywhere, and at a stock-growers' meeting in Miles City the future President characteristically urged armed action against the thieves.

In the mountains around Helena I saw flocks of thousands of sheep, mostly Hampshires and Rambouillets, which had been driven up to high plateaus for summer grazing. The herders take with them covered wagons equipped with everything necessary for living for months in the wilderness (page 726).

Much of Montana Government Owned

One of the difficult problems of the stock growers arises from the ever-increasing Federal ownership of land. The Federal Government now owns 37 per cent of all the land in Montana.

At the Capitol (page 702) I called on Montana's energetic Governor, John W. Bonner, a war veteran, who is keenly interested in the development of the State highway system. Roads, vital necessities in this land of far horizons, are built with funds raised by a State gasoline tax of six cents a gallon.

For the State Highway Commission the advertising director is young Albert Erickson, who later was my guide through the Bitterroot country. He and publicist William G. Ferguson helped me plan an itinerary.

A few miles north of Helena in the Missouri River canyon are the Gates of the Mountains —so named by Lewis and Clark, who came through them in 1805 on their trek from Great Falls toward the Pacific. I readily understood the explorers' reason for the name when some Helena men took me on a motorboat ride through the portals and back. Until our boat was almost at the Gates, I thought we were approaching a solid cliff hundreds of feet high. The apparently blank wall seemed to open as if by magic.

The highway from Helena to Great Falls follows the lovely canyon of the Missouri into strip-farming country where some of the finest hard spring wheat produced in America is grown without irrigation. The wheat is planted in cultivated strips 50 to 100 feet wide, alternated with equal strips of fallow ground. From an airplane the countryside for miles looks striped like a zebra (page 713).

Great Falls is the center of a veritable wheat empire. On the rolling hills also graze thousands of sleek white-face cattle and shaggy sheep. Oil from the rich fields around Cut Bank and Shelby is refined in a large modern plant, and the Anaconda Copper Mining Company operates here its electrolytic copper refineries, a big mill for making copper rods and wire, and an electrolytic zinc plant with a capacity of 29 million pounds a month. Natural gas is supplied from the Cut Bank fields.

Great Falls Still Defy River Navigation

From the turbulent falls of the Missouri four plants of the Montana Power Company draw more than 210,000 horsepower for use in Great Falls industry and for transmission out of the State. The first hydroelectric plant in Montana was installed at Black Eagle Falls in 1891.

Though the river here has been put to work, it is still just as impassable by boats as it was in 1805 when the Lewis and Clark Expedition toiled for 13 days to portage their gear around the falls and rapids. Navigation of the Missouri has never gone above Fort Benton, and may not get farther.

In a vast cement-floored tank house at the Great Falls electrolytic copper refineries I watched the copper anodes from Anaconda undergo final treatment. They were suspended by the ears on parallel wooden supports in 1,440 lead-lined concrete tanks filled with a solution of sulphuric acid containing 3.2 per cent copper as copper sulphate. In each tank hung 25 anodes interspersed with 26 cathodes —starting sheets of pure copper.

Electric current was passed through the tanks, and by electrolysis the copper was removed gradually from the anodes and deposited on the cathodes. When a cathode had

Kodachrome by Ray Atkeson

Lewis and Clark Cavern Is Columned and Ceilinged with Fantastic Limestone Architecture

Brown Waterfall, an amber cascade of rock; Organ Room, Hell's Highway, Lion's Den, and Coffin are aptly named wonders in one of the Nation's largest caves. An eagle disappearing into a mountainside near Whitehall led a prospector to the cavern's discovery in 1902.

Kodachrome by Ernst Peterson

Spring-blooming Glacier Lilies and Eternal Snows Are Hard to Reconcile in Glacier National Park

This recreation area straddles the Continental Divide and the international border. Canada and the United States manage their sections separately.

Going-to-the-Sun Road Is Chiseled into the Side of Garden Wall

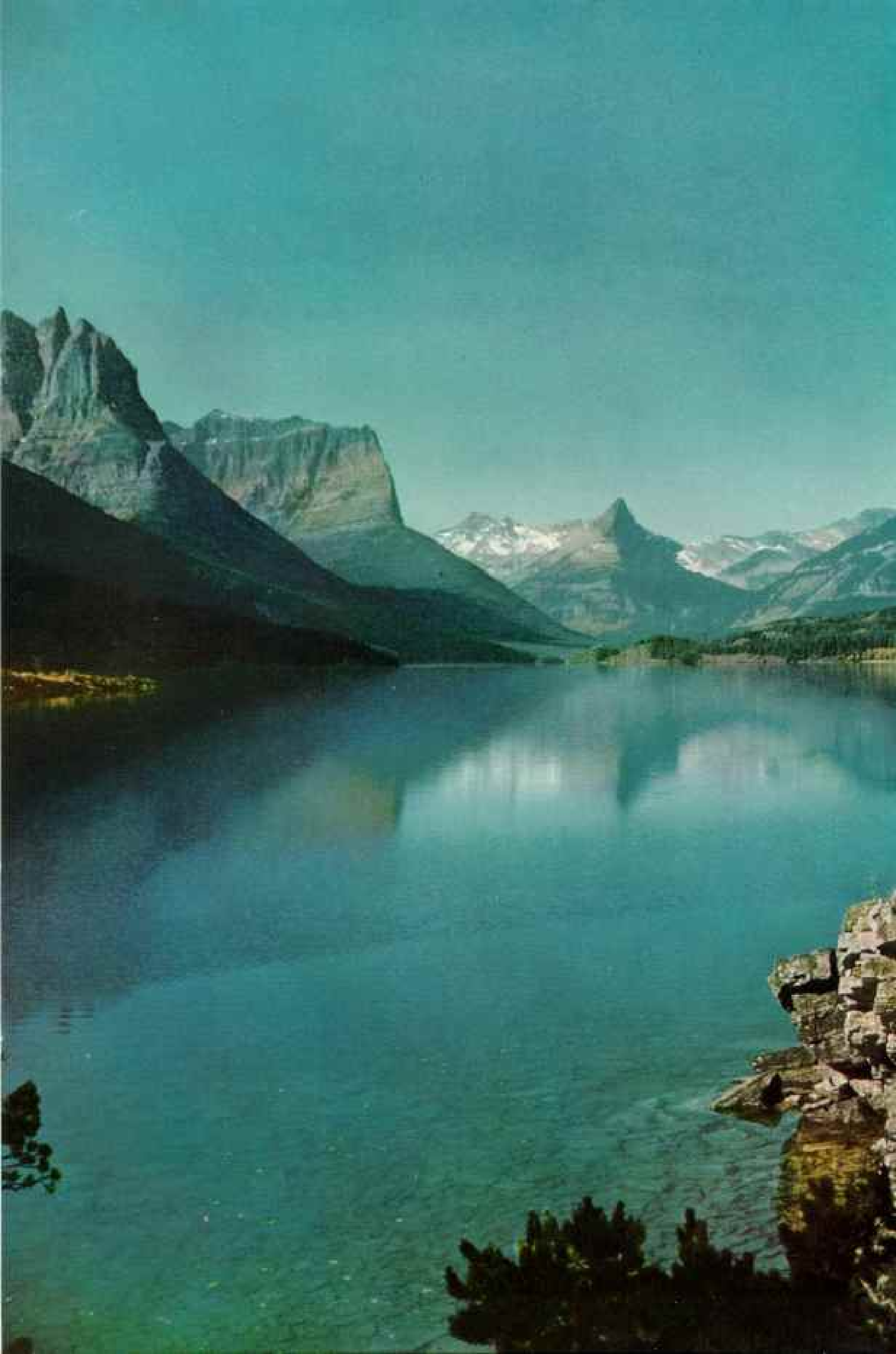
This famous highway leads motorists 50 scenic miles across Glacier National Park. It winds past blue lakes and rushing streams; it climbs mountain slopes; it looks out upon hanging gardens of wildflowers and vistas of evergreens; it roller coasters across the Continental Divide. Picnic spots, foot trails, trout streams, hotels, and chalets all invite a halt.

Construction cost 12 years' labor and the fortunes of several contractors who underestimated their difficulties. Opening of the final link in 1933 was celebrated with a peace conference between feuding Indian tribes.

Going-to-the-Sun Mountain, one of the park's most majestic scenes, named the highway. Its own name was taken from a legend of the Blackfeet, to whom in time of defeat and famine the Great Spirit sent a wise chief. Restoring the tribe to prosperity, he disappeared into the west, going up the mountain amid thunder, lightning, and snow. When the storm blew away the Blackfeet saw that the snow had formed the chief's profile as he was going to the sun.

For several miles the highway follows snow-streaked Garden Wall, here etched against the sky.

Kodachrome by Ray Atkeson



Glacier Park Peaks Shine in the Mirror of St. Mary Lake

Glacier-dug, bow-shaped St. Mary Lake is ten miles long, half a mile wide, and in places 292 feet deep. St. Mary River links it to its twin, Lower St. Mary Lake.

Indians say the lakes were named by Father Pierre Jean De Smet, a Belgian missionary who visited the region in 1864. Blackfeet revered the lakes as the home of the Wind Maker. Mountain gales at times churn the surface into whitecaps, making boating dangerous.

Going-to-the-Sun Highway (page 719) begins near the tip of St. Mary and follows its beautiful northern shore for several miles.

At the Narrows, where the lake crosses the Lewis overthrust fault, the motorist enjoys a panorama of such peaks as Mahtotopa, Little Chief, Citadel, Gunsight, Fusillade, Reynolds, Heavy Runner, Going-to-the-Sun, and Goat.

A few miles away, in Red Eagle Valley, the view includes Triple Divide Peak. Water from this eminence flows to three oceans—through the Missouri-Mississippi system to the Gulf and Atlantic, through the Saskatchewan-Nelson system to Hudson Bay and the Arctic, and through the Columbia to the Pacific.

Kodachrome by Ray Atkeson

Kodachrome by Ernst Peterson

Hay in Ross Hole Dries Beneath a Perfect Sky. A Beaver-slide Stacker Run by Tractor Hoists the Crop

Montana mountain basins, excellent cattle country because of plentiful grass and water, are known as "holes." Big Hole Basin is often called the "valley of 10,000 stacks," for after the mowing season it is literally crowded with ricks. Hay from this valley sometimes is dropped by planes to remote, blizzard-bound ranges.

Kerr Dam Transforms Flathead River to a Misty Lather

This concrete stopper in a rock-walled gorge stands on a site owned by the Flathead Indians. Built for the Montana Power Company at a cost of $12,000,000, it generates a capacity of 112,000 kilowatts and ensures a constant supply of irrigation water for orchardlands.

Kerr Dam maintains between 10-foot limits the water level in Flathead Lake, which empties into Flathead River. During glacial times the lake flowed into Little Bitterroot River, but as the ice receded this new outlet developed. Lumberjacks say the legendary Paul Bunyan dug the new channel to help the near-by town of Polson.

Distant Mission Range, home of glaciers, cataracts, and precipices, makes man's ambitious creations appear puny.

Ektachrome by Courtesy of Montana Power Company

Kodachrome by Charles W. Herbert from Western Wars

Cowboys Drive Sleek Cattle Through Upper Ruby Valley, Where Bison Roamed 75 Years Ago

As Long as Charles M. Russell's Paintings Endure, the Old West Will Never Be Forgotten

Artist Russell (1864-1926) began his life's work as a horse wrangler on a Montana ranch. When the great blizzard of 1886 struck, the absentee owners wrote asking the condition of their cattle. In reply, Russell drew on a cardboard box cover the picture of an emaciated cow huddled against the wind, a coyote lurking near by. "That tells the story better than I can write it," said the foreman, forwarding the sketch to the owners. Entitled *The Last of 5,000*, the picture hangs today in the Helena offices of the Montana Stockgrowers Association.

In appearance and humor Russell resembled Will Rogers. He was a friend of Theodore Roosevelt when "Teddy" operated a ranch in what now is North Dakota. His last painting, though unfinished, sold for $30,000.

Virtually every city in the State treasures some Russell reminder. Great Falls preserves his log-cabin studio filled with his paintings, cowboy outfit, and gifts from Indian friends. A large collection of his works, including sketches made to pay bills, is housed in the Mint Cigar Store and Bar. This canvas, *The Last Roundup*, hangs in the Northern Hotel, Billings.

Painting by Charles M. Russell, Courtesy Malcolm S. Mackay Collection

Kodachrome by Charles J. Belden

Grass Stands Deep on the Limitless Eastern Plains. Montana Ranks Third Among Wool-producing States

Pioneer cattlemen, resenting the woollies, fought many a battle with sheepmen. Miles City illustrates the harmony which now prevails; it is not only one of the State's "cow capitals" but one of its most important wool centers. In spring, when professional shearers arrive, ranches bustle with activity.

Sprinkler Irrigation, Suggesting the Water Shot from Fire Hoses, Moistens Sugar Beets near Corvallis

Montana, which started irrigation in 1882, turned to beets around 1906. The crop, yielding millions to farmers and refiners, enhanced the prosperity of Billings and Missoula. Most beets are grown under contract, prices and acreage fixed in advance. Pulp makes a rich stock food.

Kodachrome by Ernst Peterson.

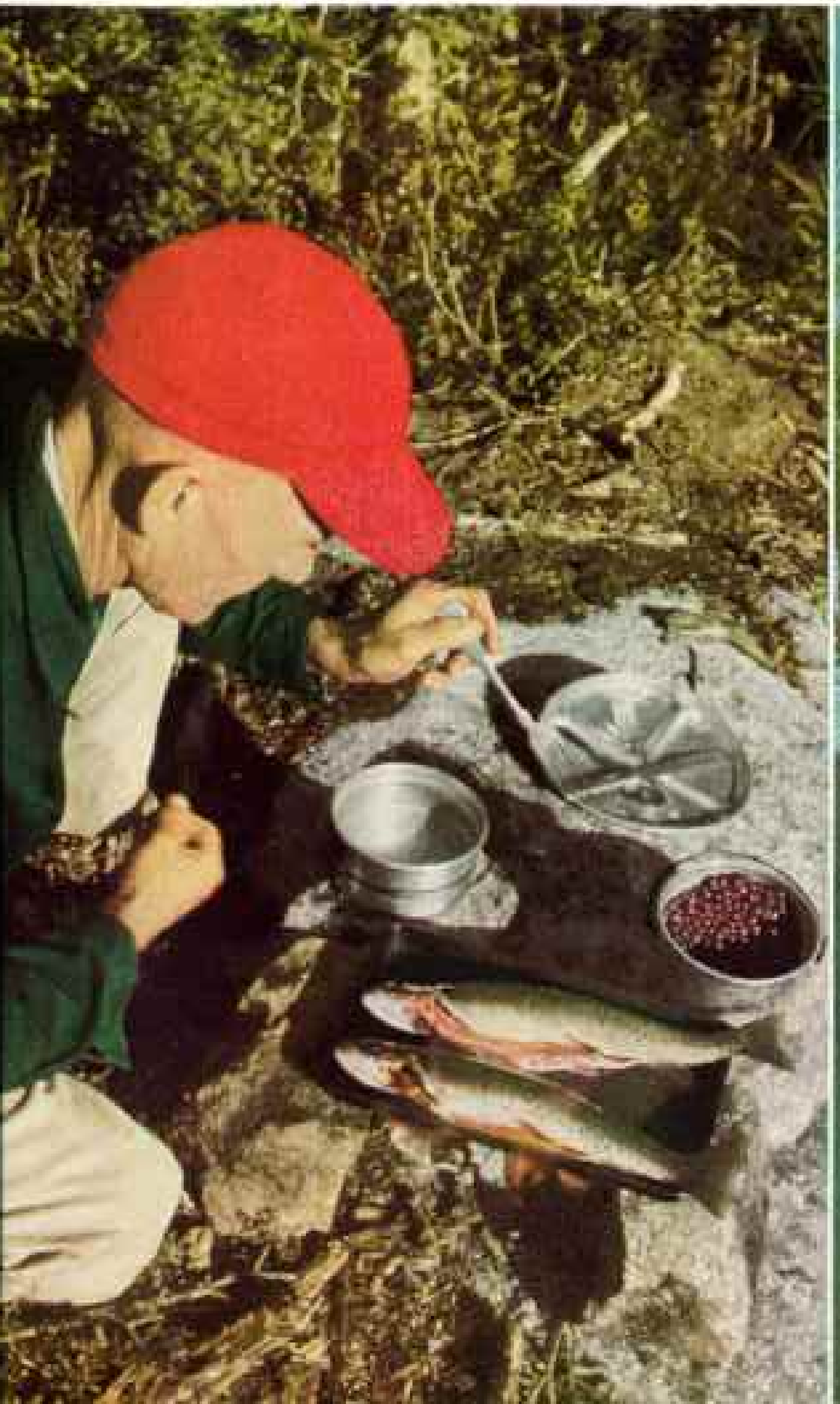
Kodachrome by Ernst Peterson

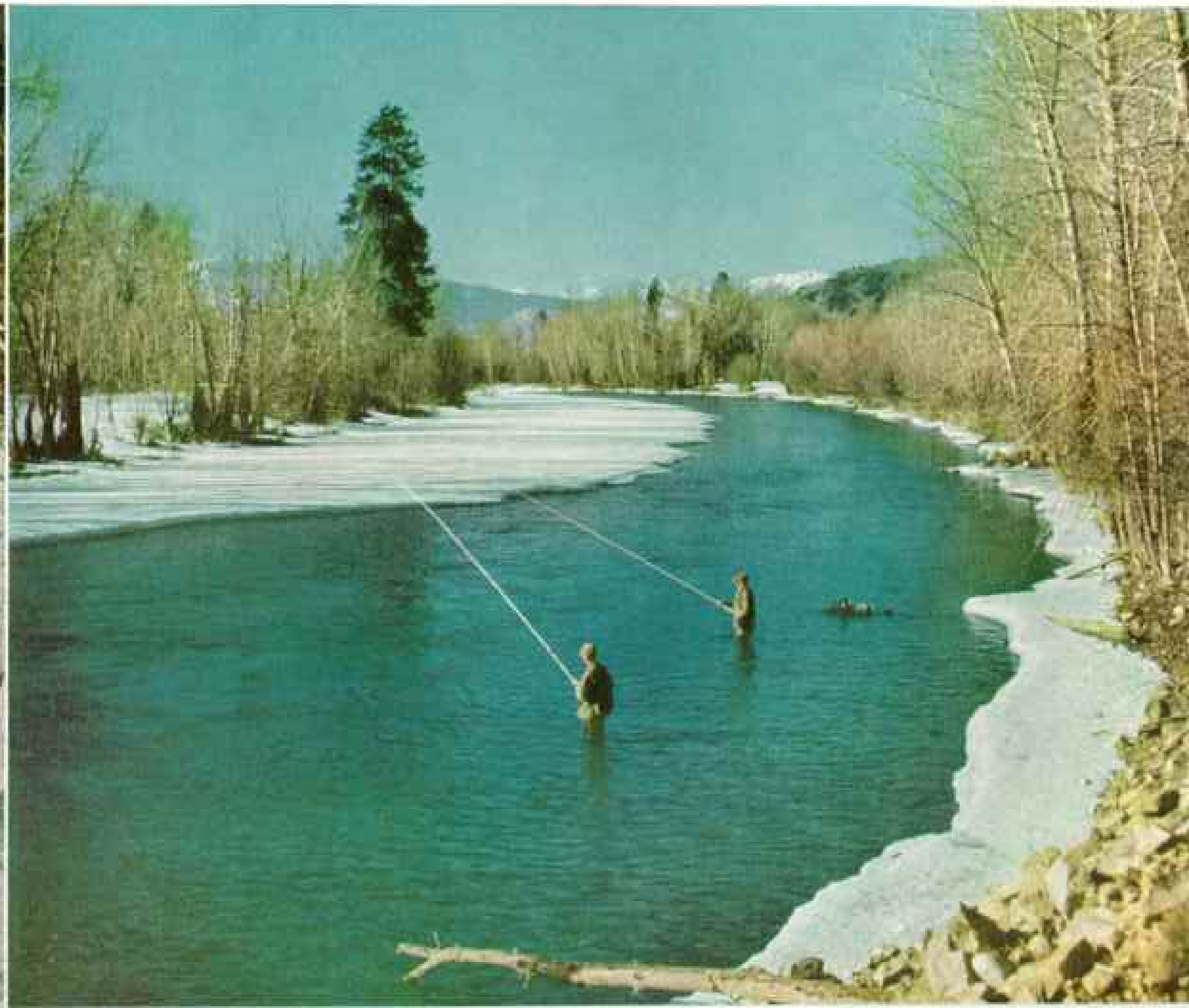
Bob Marshall Wilderness Area Entices Nature Lovers with the Lure of Lonesome Trails

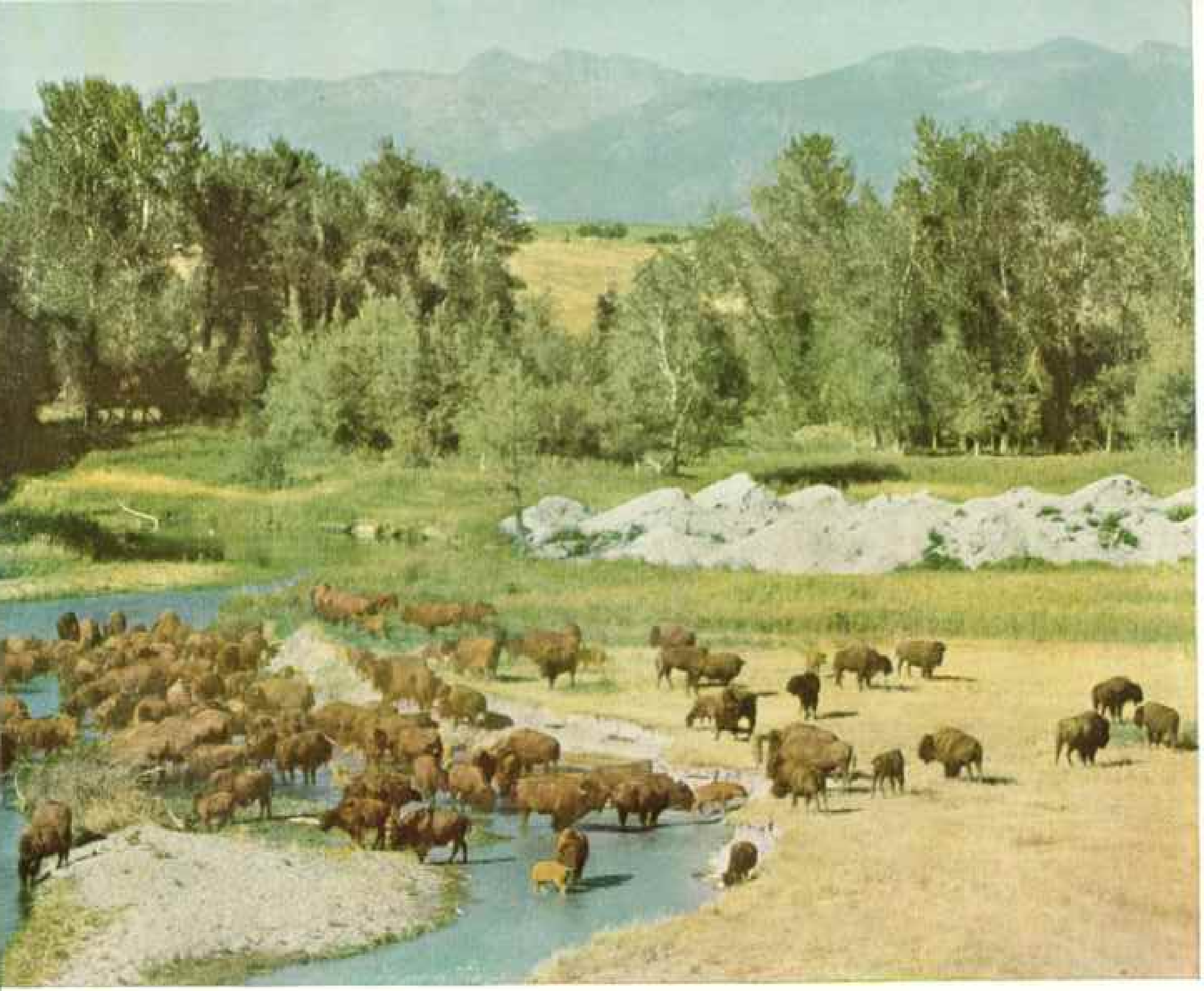
Vast stretches of Montana are kept as a public trust. This hiker, supreme on his lonely summit, looks out over a wild and rugged scene, the Swan Range. In the clear air every snowy ravine shows up like the fingerprints of a hand under a magnifying glass.

This Is the Life in Montana. The Reward for Wading Hip-deep in Icy Rivers Is Supper Browning over a Campfire

Trout, bass, grayling, and whitefish abound in mountain lakes and streams. These men fish the East Fork of the Bitterroot River. The name derives from the State flower, the bitterroot (*Lewisia rediviva*). Indians relish its starchy root.







The Thundering Herd Drinks on National Bison Range

These fenced-in buffalo graze 18,540 acres near Moiese with almost the freedom of their wild forebears. Many a motorist passing the Range is thrilled to see them silhouetted against the hills.

In the days of Lewis and Clark bison roamed the western plains almost in a continuous herd. When railroads opened the West, white hunters slaughtered the animals for meat, buffalo robes, and sheer, frenzied sport until the race became almost extinct, seemingly overnight.

In 1909 the American Bison Society established this herd for preservation of the breed. By 1927 the first 37 animals had multiplied to 640. Today the population is maintained slightly below that number. Each year's growth is thinned out by sending some members to zoos and butchering others.

Most of the time the bison make their own living, but in severe blizzards they get a Federal handout.

Two albino births—five-million-to-one shots—have occurred on the range.

Deer, elk, and bighorn sheep share the bisons' domain. A bird sanctuary was created in 1921.

Kodachrome by George R. Mashinski

Some of the Crow Indians Own Modern Homes, but in August, When They Give Their Fair, Tepees Dot the Reservation

Then the men don feather bonnets, women exhibit beaded articles, and the tribe goes all out for horse races and ceremonial dances. Some of the Crows scouted for General Custer, who with more than 200 troops was slain in battle by the Sioux and Cheyenne about two miles from the Crow Agency.

Ektachrome by R. F. Mazuchi from Western Ways

Rank's Drugstore, as It Was in the '60's, Exhibits Merchandise of Virginia City's Gold-rush Days

Gone are the times when miners strung up outlaws and paid $150 a sack for flour. Virginia City claimed 10,000 souls then. Now it has some 380; but, restored by State Senator Charles Bovey to its 1864 aspect, it enjoys a travel boom.

reached a weight of about 170 pounds, it was removed and replaced by another.

I now discovered how the gold and silver are recovered from the copper. They sink to the bottom of the tanks in a silvery slime which is taken to a separate plant and dried and purified before going to final treatment in the gold and silver refinery.

From the electrolytic refinery Bob and I went to the rod and wire mill where we watched 300-pound bars of pure copper converted into wire (page 736).

Fort Peck, World's Largest Earthfill Dam

The biggest barrier to navigation on the Missouri was created not by Nature but by man. South of Glasgow, in northeast Montana, is the huge Fort Peck Dam started in 1933 by the United States Army Corps of Engineers and now virtually complete (page 698). It is the largest earthfill dam in the world, containing 125½ million cubic yards of earth, four million cubic yards of gravel, and a million cubic yards of rock.

When full, the artificial lake backed up by the dam will be 189 miles long and 16 miles wide, with a shore line of 1,600 miles.

The original purpose in building Fort Peck Dam was to control floodwaters in the Missouri River.*

Construction of the dam has cost the Government already more than 131 million dollars, and it is estimated that the cost after the proposed new power units are in place will have risen to $136,900,000.

At the damsite the Government has built the town of Fort Peck with a population of some 2,000.

One sparkling Saturday morning Al Erickson and I left Butte on a drive that was to take us through the glorious mountain country of western Montana. A smooth, hard-surfaced highway led us for a few miles south of Butte and then swung west into the Big Hole cattle country.

As we sped along the rollicking Big Hole River, which Lewis and Clark called the Wisdom, we frequently saw anglers knee-deep in the clear riffles whipping the stream for trout and grayling. Here is a fisherman's elysium (page 729).

The upper part of the Big Hole Basin is known as "the valley of ten thousand stacks," for it is hayland extraordinary. Everywhere along the stream we saw sleek Hereford cattle grazing knee-deep in lush grass, and dotted over the meadows to the blue horizon were mountainous haystacks.

We stopped briefly at McDowell's Spokane Ranch, which runs 3,500 cattle on a tract of 35,000 acres. The wide-spreading, one-story ranch house has picture windows framing distant mountains and the chuckling river. In an immense basement the owner has a motion-picture theater large enough to seat several hundred spectators.

He told us he rents films to entertain his hired hands and his neighbors. The house is heated with gas shipped to him in steel tanks, and every building on the ranch is lighted by electricity.

With characteristic mountain hospitality Mrs. McDowell asked us to stay for luncheon, offering to prepare it herself since the ranch cook had the day off. Reluctantly we told her we had to hurry on.

At Hamilton, in the irrigated Bitterroot Valley, we went through the United States Public Health Service Laboratory, where years of research developed a vaccine that affords a large measure of protection against dread Rocky Mountain spotted fever. Dr. C. B. Parker, since deceased, showed us how the phenolized vaccine is prepared from tissues of infected ticks. Supplying an enormous demand, the laboratory distributes the vaccine free of charge.

The First Religious Service in Montana

In the summer of 1840 Father De Smet held the first religious services in Montana. The following year the famous Jesuit who brought Christianity to the Indians of the Northwest returned and established St. Mary's Mission near what is now Stevensville. A large log cross was raised in the center of the valley. For this open-air cathedral snow-crowned St. Mary Peak was the steeple, the blue sky the dome.

Father De Smet brought to Montana not only religion but an economy entirely new to the Indians. Soon after his arrival he journeyed to Oregon and brought back seed wheat, oats, and potatoes.

The fathers obtained from Europe two 15-inch millstones and set up a flour mill. From old wagon-wheel tires they hammered out units for a sawmill.

In Missoula Al and I stayed overnight in the new air-conditioned Florence Hotel. Missoula, a tree-shaded city at the hub of five fertile valleys, is the center of a rich agricultural district in which principal crops are wheat, oats, barley, and sugar beets. According to latest estimates, the metropolitan area has a population of 25,000.

The Montana State University is here, the

* See "Taming the Outlaw Missouri River," by Frederick Simpich, NATIONAL GEOGRAPHIC MAGAZINE, November, 1945.

Kaiser Nelson from Northern Pacific Railway Co.

Soon This Palomino Colt Will Wear a Brand

Working cowboys still handle the lariat on Montana ranches. In the Tongue River country the old West remains little changed. More than 150,000 horses are required to supply riders throughout the State.

largest of the six colleges making up the Montana State University system administered by a State Board of Education. Other units are the Montana State College at Bozeman, the Montana School of Mines at Butte, the Western Montana College of Education at Dillon, the Eastern Montana College of Education at Billings, and the Northern Montana College at Havre.

Smoke Jumpers Fight Forest Fires

On the outskirts of Missoula we visited Hale Flying Field, headquarters for fire-fighting activities of the United States Forest Service, Region 1. An intrepid corps of 150 "smoke jumpers" were standing ready to fly to any fire within a radius of hundreds of miles.

When a fire is sighted anywhere in the vast timbered area, a central dispatcher reports its exact location as determined by triangulation of readings taken from several stations.* A crew of 10 to 15 Hale Field boys, fully equipped with parachutes and fire-fighting apparatus, will be in their specially constructed planes and in the air in 20 minutes at the most. Once they were on the way in 14 minutes after the call came in.

These boys have a hazardous occupation, but an official at the field told me he has a constant waiting list of 1,000 eager to join the corps. They fly to the fire, parachute to the ground, and fight the blaze with the most efficient methods (page 711).

North from Missoula we drove down the Jocko Valley and over a low divide into the Mission Valley. On the trip we passed St. Ignatius, founded by Fathers Joseph Minetrey and Adrian Hoecken, associates of Father De Smet.

We caught a fleeting glimpse as we skirted the National Bison Range near Moiese of a herd of shaggy buffalo silhouetted against a brown, grassy hill (page 730).

In midafternoon we were greeted by jovial

* See "Forest Lookout," by Ella E. Clark, National Geographic Magazine, July, 1946.

giant "Buck" Winters in the sprightly resort town of Polson, at the lower end of Flathead Lake. Flathead Lake, gleaming among cherry orchards, at the foot of the snow-crowned Mission Range, is one of the beauty spots of Montana (page 707).

Some miles from town we visited the superb Kerr Dam and power plant of the Montana Power Company, on the Flathead River (page 723). This dam has a generation capacity of 112,000 kilowatts of electricity and controls the water level of Flathead Lake between 10-foot limits.

Built at a cost of 12 million dollars, the dam is attended by the men of only eleven families living in a charming settlement near the foot of the spillway.

We drove up the east side of the lake through graceful cherry orchards and paused for the night at a rustic lodge at Big Fork on the northern end. The next day we were in the lively city of Kalispell, which has nearly doubled its population in the last ten years.

Here Phil Kingston who, though born and educated in England, has become an enthusiast for the romantic reaches of Northwest wilderness, took us to a mountaintop park from which we had an unobstructed view of 50 miles of matchless beauty. We could see the majestic peaks of Glacier National Park gleaming on the horizon.

Where Ski Championships Are Decided

In the afternoon we drove to the city of Whitefish and around Whitefish Lake, famous for fighting Mackinaw trout. A rugged road took us to the ski chalet on the shoulder of Big Mountain. Here in 1949 ski championships were decided on one of the most hair-raising runs in the United States.

To see a great lumber mill in operation, we drove through heavy forest to Libby. About 15 per cent of the Christmas trees sold in the United States each year are cut in northwestern Montana, and the little town of Eureka has been dubbed the Christmas tree capital of the United States.

At the J. Neils Lumber Company in Libby we watched giant logs haled by machinery out of log ponds and put through the mills. Some were peeled, creosoted, and made into poles for telephone lines. Others were sawed into finished lumber.

Of particular interest was one big mill where sawdust was compressed into "Prestologs," which burn cleaner and with more intense heat than coal. I watched thousands of these fireplace logs tumbling out of the machines which roll them into rock-hard, shining cylinders.

The next day we visited the site on the South Fork of the Flathead River where the U. S. Bureau of Reclamation is building Hungry Horse Dam (page 715). The tremendous project was well under way, and concrete pouring was ready to start. On an observation platform hundreds of feet above the wide valley we listened to a broadcast telling about the proposed structure, which, it is estimated, will cost $108,800,000.

A large signboard near the eyrie held the announcement that the dam is to be a development of Columbia Valley power. The Flathead River is a part of the system of streams that make the mighty Columbia.*

Tired from many days on the highways, I came toward evening to the west entrance to Glacier National Park. Peace seemed to flow around me from the glorious setting as superintendent J. W. Emmert took me through fragrant aisles of fir and spruce trees and along the still, darkling waters of Lake McDonald to the massive structure of rough-barked logs that is Lake McDonald Hotel.

I stayed in the park four nights, one in the Lake McDonald Hotel, two in the Many Glacier, and one in the Glacier Park. To see the thousand beauties of this unspoiled Eden, I should have had at least three weeks, for Glacier is a place for hikes and saddle trips. There are more than 1,000 miles of well-kept foot and horse trails leading to the great solitude where 60 glaciers have their source (pages 708 and 718).

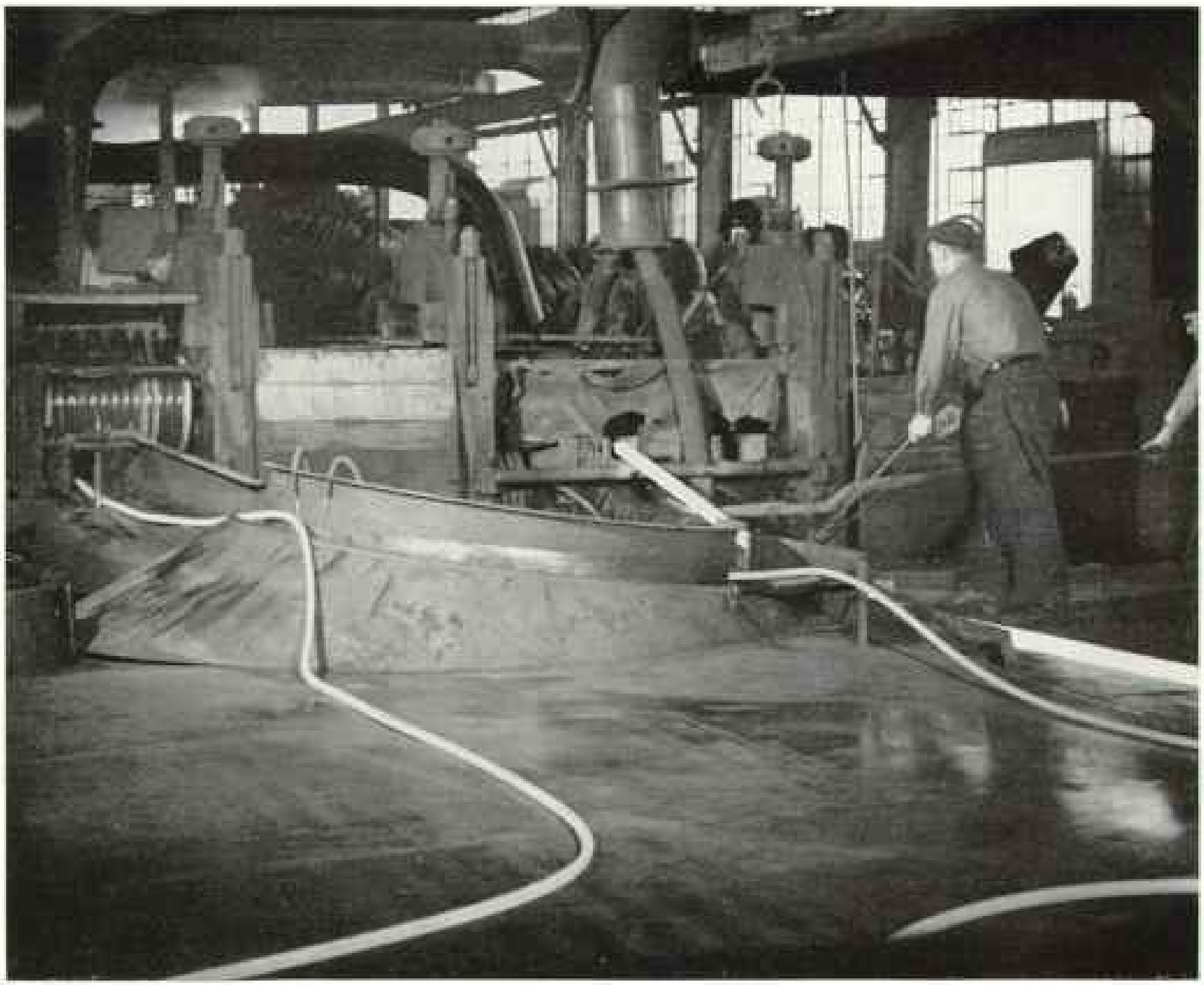
Mr. Emmert showed me around as much as possible in four all too short days. One morning we drove on a rough wood road far up Lake McDonald to a small tarn where a wild cow moose was wading near the sedgy shore.

We stood on the porch of a ranger station at another time and watched through binoculars a flock of Rocky Mountain sheep high on a meadow above timber line. On a boat ride and hike from Many Glacier we were lucky enough to spy five magnificent mountain goats leaping from crag to crag a thousand feet above us (page 701).

"Gertie," the Blond Bear, Back from Exile

Bears, of course, were everywhere, and the park visitors as always were disregarding warnings by feeding and even petting them. "Gertie," the blond bear who had been declared a nuisance, had been hauled away to a distant game refuge a week before my arrival. To Mr. Emmert's amused disgust, she was back at her regular stand the day we drove

*See, in the National Geographic Magazine: "Oregon Finds New Riches," by Leo A. Borah, December, 1946; and "Columbia Turns on the Power," by Maynard Owen Williams, June, 1941.



Anaconda Copper Mining Co.

Red-hot Copper Snakes Writhe in the Rod and Wire Mill at Great Falls

After passing through shaving machines for removal of rough spots, 300-pound bars are heated and machine-rolled into ever-thinning rods. As these lengthen, they are flung out of the rollers upon steel platforms (above). Workmen catch loose ends with tongs and start them into the next machine, which draws them into wire. Bars which began the journey three feet long and five inches thick emerge as thin strands suitable for braiding into cable (page 733).

over Going-to-the-Sun Highway (page 719). She was standing upright on the pavement near Lake McDonald Hotel begging plaintively.

The day I arrived at Many Glacier, Howard Hayes, president of the Glacier Park Transportation Company, took Mr. Emmert and me to the Prince of Wales Hotel, across the Canadian border. The whole park, including the smaller north portion in Alberta, is called the Waterton-Glacier International Peace Park.

We had a delightful boat ride on Waterton Lakes across the international boundary and back. To mark the division between the United States and Canada, there is only a 20-foot strip cleared through heavy timber. It comes down to the lake on either side like a logging chute.

The evening before we reached Glacier Park Hotel, Mr. Hayes and I had dinner at Two Medicine Chalets. There we met President James Bryant Conant of Harvard, who, with his wife and son, had been tramping the lonesome trails for a month. They were enthusiastic because they had found the wilderness entirely untamed, a place where people can get away from the workaday world (pages 720 and 721).

Leaving a "Land of Enchantment"

Reluctantly leaving this land of enchantment, I made a vow to return some happy summer for a carefree vacation.

Amazing Montana, "high, wide, and handsome." As the old-timers who know it from its weirdly sculptured eastern Mako Sica (Badlands) to its cloud-vaulting western peaks proudly boast, "It has everything except skyscrapers and high hats."

The Vienna Treasures and Their Collectors

By John Walker

Chief Curator, National Gallery of Art

ONE of the most precious shipments of art to cross the ocean at one time is touring America. It consists of paintings, sculpture, armor, tapestries, and jewels accumulated during four centuries by the Austrian Hapsburgs, and now the property of the Austrian Government.

These works of art have already been shown in many of the capitals of Europe and in Washington and New York (page 739). Before their return to Austria, they will also be seen in San Francisco this summer and Chicago in the fall.

Their itinerary is the final stage in an art migration which began during the last war, when the contents of European museums were moved to salt mines, monasteries, bank vaults, and country houses, narrowly escaping war's destruction.

Peace brought out these buried masterpieces; but in many cases, like displaced persons, they returned to ruined homes. Such was the fate of the Austrian treasures. As a result, they are being enjoyed by hundreds of thousands of Americans, and 23 of the greatest paintings are reproduced in color with this article.*

Wars disseminate as well as destroy art. Centuries ago a comparable cargo crossed the ocean, traveling in the opposite direction. It was dispatched by Cortés after the conquest of Mexico.

"Fairer to See than Marvels"

This earliest of transatlantic art shipments journeyed to Europe in an armed galleon, a part of the Spanish fleet, then the most powerful afloat. Four centuries later the Hapsburg collections traveled to the New World in an air-conditioned refrigerator ship, a part of the United States Navy.

Between 1520 and 1521, Albrecht Dürer, the German painter, happened to be in the Netherlands when Montezuma's treasure arrived at the court of Charles V. Thus he saw history's first European exhibition of American art. He noted in his diary that these examples of pre-Columbian craft were "fairer to see than marvels. I have never seen in all my days what so rejoiced my heart."

Four hundred years later, we might say the same of the first American exhibition of these treasures of European art once owned by Charles V and the Austrian Hapsburgs.

What makes the Austrian show so fascinating is that, though it comes from a public museum, the Kunsthistorisches Museum in Vienna, it is really an exhibition of the greatest of private collections. It reflects the acquisitive instincts of one family during a score of generations. The pictures decorated the walls of their palaces, the statues are their effigies, the rock crystals held the wine and water they drank. As recently as 1916, for example, the Burgundian court goblet now on display was used in the coronation of Emperor Charles as King of Hungary.

The collection has a character different from that of the usual agglomeration of museum objects. It suggests kingship rather than curatorship, and mirrors the disintegration of a dynasty but the survival of its taste.

Dürer Depicts Christian Martyrdom

The painting section opens with a work by Albrecht Dürer, who owed so much to Hapsburg patronage. It is a picture of the slaughter of 10,000 Christians (pages 760-761).

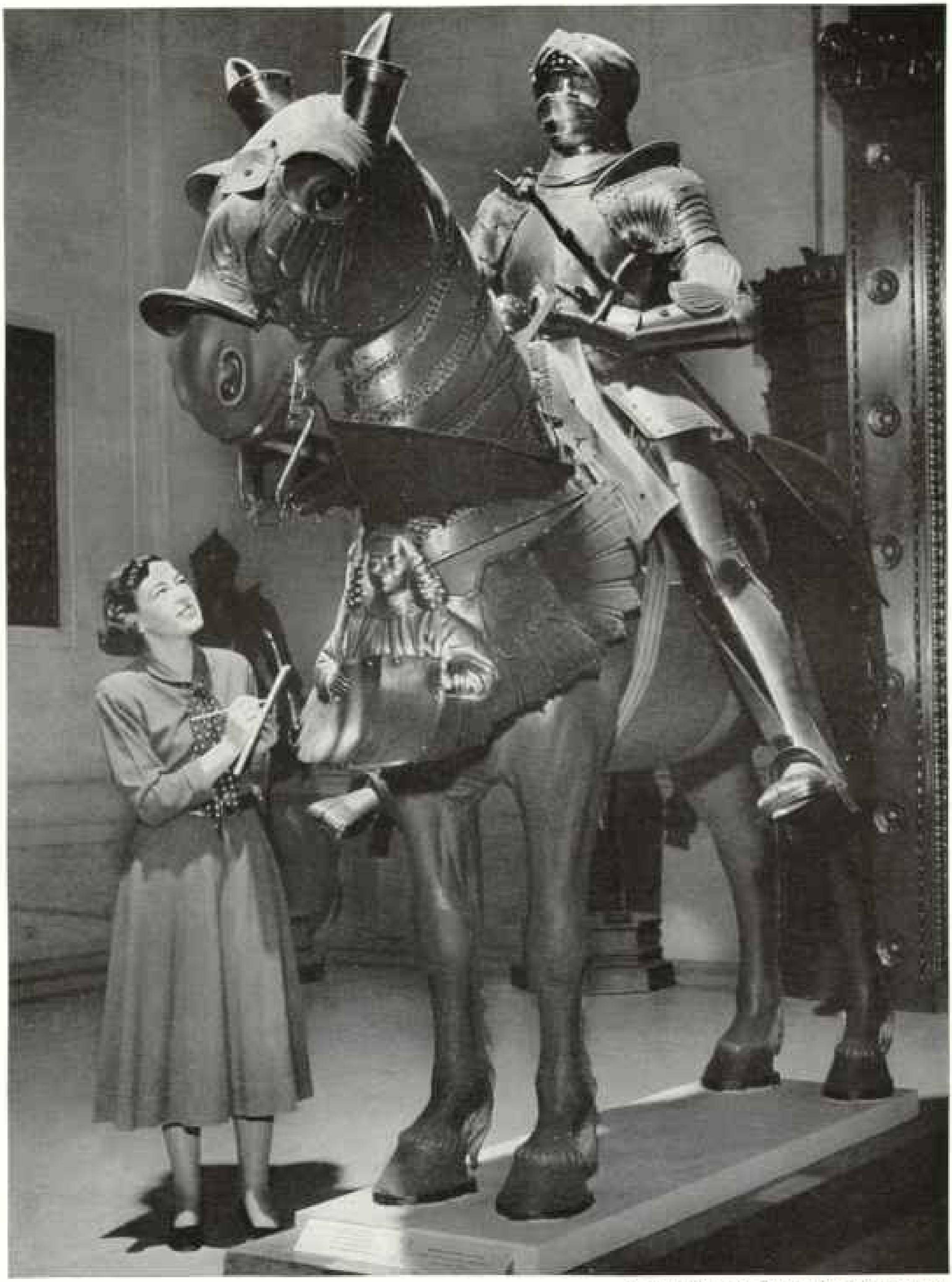
Once on panel but later transferred to canvas, Dürer's painting is the exhibition's sole representative of the great collection of early Flemish, German, and Austrian pictures in the Kunsthistorisches Museum.

Most of those works were painted on wood, which contracts and expands under varying conditions of temperature and humidity. Therefore panel paintings are most fragile and difficult to transport. Omitting them meant the omission of the unique Viennese collection of Pieter Brueghel the Elder, the saddest gap in the show.

Still, the exhibition, by concentrating on the High Renaissance and the 17th century, by focusing attention on the summits of Western painting, reflects the essential taste of the Hapsburg collectors, who themselves considered earlier art more interesting historically than stimulating esthetically.

For these monarchs the pillars of painting were Titian, Velázquez, and Rubens. As a result of their patronage, the collections of the Prado in Madrid, formed by the Spanish Hapsburgs, and of the Kunsthistorisches Museum in Vienna, formed by the Austrian Hapsburgs, have an unparalleled series of examples of the work of those three artists.

* For reproductions of German-owned paintings which similarly escaped the war and toured America, see "Masterpieces on Tour," by Harry A. McBride, National Geographic Magazine, December, 1948.



National Geographic Photographer Robert F. Sisson

Fancy Frederick III, Thus Bedecked, Parading on a Charger at the Head of His Troops

Two of Europe's most famous armorers, Konrad Seusenhofer and Lorenz Colman, wrought these 90-pound trappings for the 15th-century German ruler and his son, Maximilian I. An embossed angel with spread wings protects the horse's chest. Emblems of the Order of the Golden Fleece cover plates on neck and head.

Thomas W. Keller, The Washington Post

America's Art Lovers Flock to See Treasures Once the Pride of Royal Connoisseurs

These Washingtonians view "Diana and Callisto" (center) and other Titians from the Vienna Collections, in the National Gallery of Art. On opening day 41,725 attended the exhibition—more than watched a big-league professional football game a few miles away. Total attendance for the 44-day Washington showing was 875,173. From the Nation's Capital the paintings, sculptures, armor, tapestries, and other works lent by the Austrian Government began a journey to New York, San Francisco, and Chicago museums.

However, the first outstanding collector among the Austrian emperors, Rudolph II, died while Rubens and Velázquez were still young. Like his successors, he encouraged contemporary art and also purchased the work of earlier artists. The painting by Dürer which I have mentioned belonged to him, and it was his taste which discovered the greatness of Pieter Brueghel the Elder.

Brought up by his uncle Philip II, Rudolph sought to make of his castle in Prague a treasure house comparable to the Escorial in Spain.

A strange, melancholy creature was this early Hapsburg connoisseur. He buried himself away from the world in his gloomy fortress, known as the Hradschin.

Ambassadors waited for audiences, sometimes for weeks, while Rudolph lived among artists and craftsmen. For them he always found money, though there were days when no one at court ate because of lack of funds.

When Rudolph had acquired a new work of art, he would sit for hours in front of it and would fly into a fury if addressed. He had a passion for precious stones and rare metals; and, though the many alchemists he employed never succeeded in discovering the secret of the transmutation of chemical elements, his goldsmiths and silversmiths created some of the most marvelous jewelry in the world.

Living Dodo Painted by Savery

Rudolph seems to have loved animals more than humans. He had beautiful white horses to admire but not to ride. Eagles and lions he tamed and kept in his rooms. When his two favorite lions died simultaneously, he was heartbroken.

Rudolph's passion for birds and beasts is reflected in the work of Roelandt Savery, who

spent 11 years in his service. Savery achieved fame among ornithologists because he was, so far as we know, the only artist who ever painted a live dodo. Consequently, his "Landscape with Birds" (page 751), where a dodo stares soulfully at an eel, has considerable scientific interest.

The emperor must have been pleased with this accurate portrayal of one of the last of a species. Indeed, there is a certain affinity between a bird soon to be extinct and Rudolph II, who was, in his gauche, neurotic way, an equally awkward creature, an equally outlandish survival of the past.

Like many of the Hapsburg rulers, Rudolph II was more successful as a collector than as an emperor. During his lifetime he accumulated works of art valued in the 17th century at 17,000,000 gulden, about $50,000,000, though in terms of the comparative purchasing power of money vastly more.

At the end of the Thirty Years' War, Swedes under Königsmarck swept into Prague and looted the Hradschin. Even while peace was being concluded, Königsmarck, the Swedish general, loaded barges with pictures and floated them down the Elbe to enrich the collection of his sovereign, Christina of Sweden.

Except by a few countries, including the United States, works of art have always been considered the spoils of battle. Recently the Russians, for instance, carried off the fabulous booty of the entire Dresden gallery, as well as much from the Berlin museums.

Titian 91 When He Painted Jacopo

Rudolph's renown as a collector was due in part to the services of an expert and art dealer, Jacopo de Strada. Titian has portrayed this shrewd antiquarian holding a statue of Venus tenderly, almost caressingly, its certificate of authenticity lying on the table, the coins from an earlier sale impressively displayed (page 744).

What an appraising, crafty glance this salesman gives his customer, perhaps the Emperor Rudolph himself! Here Titian has recorded the archetypal dealer, the universal purveyor of works of art, as he has plied his trade from the days of Pliny to the present time.

The portrait of Jacopo de Strada was painted when Titian was 91 years of age, the "Danaë" (page 759) when he was 77, and Pope Paul III (page 764) when he was about 72. This was the period when the most distinguished of Venetian artists reached the summit of his genius.

In these late works of Titian, so richly represented in the exhibition, the tonality of the paintings has the soft, indistinct beauty of colors remembered from a dream, and the contours have the wavering adumbrations of form apprehended with fading vision.

Though Jacopo de Strada was the expert and principal dealer for Rudolph II, his portrait was not bought by his patron. It was added to the Hapsburg collections by a cousin of Rudolph's, the Archduke Leopold Wilhelm, Bishop of Olmütz, Passau, and Strassburg, Grand Master of the Teutonic Order and Governor of the Spanish Netherlands from 1646 to 1656.

This wealthy princeling, who at the age of 15 held nine of the richest sinecures of the Church, was intended by his imperial father, Ferdinand II, to be a military leader; but born connoisseurs rarely make brilliant commanders, and Leopold Wilhelm was no exception. He was notorious as the consistent loser of all the battles he fought.

The archduke was famous, however, as the shrewdest collector of his generation. Enriched by his governorship of the Spanish Netherlands, he owned 1,397 paintings, 437 drawings, and 542 pieces of sculpture, besides acres of tapestry.

Leopold Wilhelm had the modern esthetic sense. Not for him those collector's items of his ancestors, rarities such as the horn of a unicorn or that more exotic but no less undesirable object, at least for a museum, the jawbone of a mermaid. These relics he weeded out. His acquisitions were limited to art.

To help him assemble his collection, the archduke too had his experts. One of these was David Teniers, the painter, who not only advised on purchases but also provided his patron with copies of paintings in the archducal collection. These Leopold Wilhelm sent to Spain and elsewhere to arouse the envy of other collectors, much as privately printed catalogues and color reproductions are distributed today.

Courtly Life Sublimely Expressed

One of the most interesting paintings by Teniers is a view of the archduke's gallery with Teniers himself showing Leopold Wilhelm some recent acquisitions (page 752). The painting shows, hanging on the walls, eight canvases which are included in the present Austrian exhibition. Three of them are reproduced in this article (pages 744, 769, and 770).

As one can see from this view of his gallery, Leopold Wilhelm loved Italian art, which he had come to appreciate as a young man during his education at the Spanish court. He was charmed especially by Paolo Veronese. In the

JAN VERMEER (1632–75), Dutch • The Artist in His Studio

With this famous canvas the NATIONAL GEOGRAPHIC MAGAZINE introduces 27 paintings from the Vienna Collections now being exhibited in the United States. Most of the collection was accumulated by the Hapsburgs during their centuries of rule. Austria sent 171 paintings and many additional treasures to this country on loan. The $80,000,000 cargo crossed the Atlantic in a United States Navy refrigerator ship.

Adolf Hitler is reported to have paid 2,800,000 reichsmarks (then about $1,120,000 at the official exchange rate) for "The Artist in His Studio," which he planned to install as the centerpiece of a postwar art gallery at Linz, Austria.

American troops rescued the painting, together with many other masterpieces, from a salt mine at Alt Aussee. All were returned to the Austrian Government.

Vermeer's painting, with its masterful organization of color and detail, caused more comment than any other. The model wears the allegorical costume of Fame. The artist is believed to have worked with the aid of two mirrors.

JACOPO TINTORETTO (1518–94), Italian • Susannah and the Elders

PETER PAUL RUBENS (1577–1640), Flemish • *The Four Continents*

TITIAN (1477–1576), Italian • *Jacopo de Strada*

Though past 90, Tiziano Vecelli (Titian) painted with unflagging genius when he created this character study. His subject was the principal expert and art dealer for the Emperor Rudolph II. The painting was added to the Hapsburg collection by Rudolph's cousin, the Archduke Leopold Wilhelm. Deftly, Titian caught De Strada's crafty, appraising glance directed toward a customer. The antiquarian holds a statue of Venus; coins from an earlier sale lie on the table.

DIEGO RODRIGUEZ DE SILVA Y VELÁZQUEZ (1599–1660), Spanish • *The Infanta Maria Theresa*

As technicians, few painters matched Velázquez, delineator of 17th-century Spanish royalty. Said James Abbott McNeill Whistler: "She (*i.e.*, Art) dipped the Spaniard's brush in light and air." Others regarded Velázquez as a cold, indifferent genius whose soul never appeared in his pictures. His portrait of the Infanta Maria Theresa, daughter of King Philip IV and later the wife of Louis XIV, is typical of his many court paintings.

746

JAN STEEN (1626–79), Dutch • The World Upside Down

JACOB JORDAENS (1593–1678). Flemish • The Feast of the Bean

PAUL VERONESE (1528–88), Italian • *Lucretia*

Paolo Caglari (called Veronese after Verona, his native city) was essentially a decorative artist. He loved to portray the pageantry and magnificence of religious and mythological themes. His works have been described as appealing to the eye rather than to the intellect. Faces of his women and children are beautiful and sometimes animated, but they lack emotional depth.

Lucretia, shown plunging a dagger into her breast after being outraged by Sextus Tarquinius, displays an unnatural calm. Her death led to a revolt in which the Tarquin rulers of Rome were overthrown about 510 B.C. Shakespeare tells the story in *The Rape of Lucrece*.

Paintings by Veronese were favorites of the Archduke Leopold Wilhelm, foremost of the Hapsburg collectors and one of the shrewdest judges of art of his generation.

canvases of this master of decorative painting he found the ideal of courtly life sublimely expressed.

"Christ Healing the Woman with an Issue of Blood" seems less a demonstration of the miraculous than a lesson in gallantry (page 769). It shows a grand seigneur bestowing his favors on a beautiful suppliant, with all the actors in the scene masters of elegant gesture, models for the ceremonious manners of Leopold Wilhelm's court.

In the same artist's half-length of Lucretia (page 748), who points her dagger at her breast before committing suicide, how graceful is the heroine's gesture and how dignified her acceptance of her fate.

Tintoretto was another artist whom Leopold Wilhelm seems to have admired, especially for his portraiture.

The archduke liked paintings of heroic men of action, such as Tintoretto's "Man in Armor" (page 757), the type of self-confident warrior that the archduke was never able to be himself; or subtle pieces of characterization, such as his double portrait of an old man and a boy, perhaps a grandfather and a grandson, since they bear some family resemblance (page 765).

This painting, in its contrast of youth and age, is one of the most touching portraits executed by Tintoretto. The little old man, desiccated, wrinkled, bent, stares into space, absorbed in his memories. The boy beside him, in the first bloom of youth, stands erect, challenging the spectator and the world. The heartaches of the old man are almost ended, while the cares and anxieties of the boy are still to come; the old man seems wearily falling back into that childhood from which the youth has just emerged.

Radiant Womanhood and Rheumatic Age

The greatest of all the Tintorettos in the Vienna gallery, and one of the greatest paintings in the world, "Susannah and the Elders," would also have appealed to Leopold Wilhelm's discriminating taste; but either it was overlooked by his agents in Venice or they could not persuade its 17th-century owner, Nicolo Renier, to sell (page 742). Consequently, this canvas, so maliciously witty and so radiantly beautiful, did not enter the royal collections until a later date.

What mischievous observation there is in the old graybeard who peeks around the hedge, his stiff, rheumatic body in such violent foreshortening that we almost feel a twinge of muscular pain; and then Susannah, her nudity the one glowing passage in the composition, how magically Tintoretto has portrayed her opulent beauty, dowering her flesh with some mysterious incandescence!

The diagonal recession into the picture suggested by the figure of the old man, and the concentrated illumination falling on Susannah, as from a hidden spotlight, contained all the elements that dominated Baroque design for the next hundred years.

Lorenzo Lotto's "Virgin and Child with Saints Catherine and James the Great" (page 771), which is first described in 1660 as being in the Imperial Collection, testifies to an interest in the more tranquil, dreamy phase of Venetian painting.

The type of composition is often known in Italian art as a *Sacra Conversazione*, or Holy Conversation, though the participants do not seem to speak so much as to suggest through glance and gesture a mood of tranquil communion.

During his governorship of the Netherlands, the court of Leopold Wilhelm swarmed with artists; at one time there were 65. The archduke, though he preferred the refinement of Italian art, was broad enough to appreciate the earthiness of Flemish painting. From a contemporary, Jacob Jordaens, he acquired "The Feast of the Bean" (page 747).

No repellent detail of this "proto-cocktail party" is spared, until one cannot but agree with the Latin text in the cartouche: "Nothing resembles insanity so much as drunkenness." Jordaens's canvas reaches the limit of grossness.

The coarseness of "The Feast of the Bean" seems out of key with the elegance of the other pictures in Leopold Wilhelm's collection. Among Flemish artists much more to his taste must have been Sir Anthony Van Dyck. In his canvases the compositions of Italian art appear in Northern dress.

Though the glow of Titian's palette has changed to a more somber scheme, so that misty rose, ashen yellow, and dull green transform the golden radiance of Venetian color into a cinereous, almost sooty tone, nevertheless, canvases like "Samson and Delilah" (page 758) or "The Blessed Hermann Joseph Adoring the Virgin" (page 767) challenge the grand manner of the Venetian style.

Van Dyck portrayed a friend of Leopold Wilhelm, Rupert of the Palatinate, nephew of Charles I of England and son of the unfortunate Frederick V and Elizabeth Stuart, Winter King and Queen of Bohemia (page 762).

Rupert's family were driven from their throne by Leopold Wilhelm's father, Ferdinand II; yet the two young men had a bond deeper than dynastic enmities—they both loved art.

National Gallery of Art

Tusks of Extinct Tiger Boar Crown This Rhinoceros-horn Goblet

Such oddities from the Vienna Collections reflect a Hapsburg taste for fine craftsmanship and the bizarre. Left: a beaker fashioned from ivorylike narwhal horn, once thought a safeguard against poison. Right: a goblet of bezoar, a hard substance found in the stomachs of certain cud-chewing animals. Ancients considered bezoar a remedy for disease (page 773).

Rupert was the more creative. He was credited with the invention of the art of mezzotint. Scholars now give priority to Ludwig von Siegen, but in any case they admit Rupert to have been the better artist.

In the 17th century connoisseurship was an international passport valid in any country. The representative figure of this esthetic internationalism was, appropriately enough, an artist, Peter Paul Rubens.

Rubens Foreshadowed United Nations

Of Flemish origin, Rubens painted for the Spanish and Austrian Hapsburgs, the French Bourbons, and the English Stuarts. He advised them in matters of art and of diplomacy, and for his activities was knighted by Charles I of England. He was a citizen of the world, but, as his self-portrait reveals, he appraised this world shrewdly (page 763).

In view of the cosmopolitanism of Rubens, it is fitting that one of his early masterpieces should be an allegorical representation of the Four Continents in happy coalition (page 743).

Here is a painting which should hang in the Assembly of the United Nations as a symbolic representation of that friendliness among the peoples of the world which alone can prevent the outbreak of war, or, in terms of Rubens's allegory, keep the crocodile from attacking the tigress.

Yet, even in the 17th century, ideological conflicts had already begun to divide the unity Rubens typified. It is significant that Leopold Wilhelm apparently did not own a single painting by a great Dutch artist, though his governorship of the Spanish Netherlands corresponds with the period of Holland's highest achievements.

Could it be that the archduke, influenced by the emotions of the Counter Reformation, looked with disfavor on the Dutch Protestants and the artists who painted for them?

Later Hapsburg connoisseurs were voracious collectors of Dutch painting. Maria Theresa, for example, acquired a canvas by Jan Steen, entitled "The World Upside Down" (page 746), which is the Dutch equivalent of the "Feast of the Bean"; and Leopold I, Joseph I, and Charles VI all enriched the royal collections with many masterpieces from Holland.

It was not that Leopold Wilhelm disliked the realism characteristic of Dutch artists. He acquired a fine canvas by the Spaniard Jusepe de Ribera as realistic as anything painted in Holland, though planned with a dramatic emphasis that is typically Spanish.

National Gallery of Art

Artist's Error Gives the Clumsy Dodo Two Right Legs

Roelandt Savery, Flemish artist, included this detail in "A Landscape with Birds," painted in 1628 for nature-loving Emperor Rudolph II. Savery is believed to have been the only master who ever sketched a live dodo (page 740). Later copyists repeated his structural mistake. The flightless, almost wingless bird, a native of Mauritius, became extinct about 1681.

In this painting of "Christ Among the Doctors" (page 770) Ribera attained his dramatic effect in no small measure by contrasting the pale, smooth features of the young Christ with the weatherbeaten, browned, and wrinkled faces of the old scholars.

Effects of chiaroscuro, so popular among the Dutch, the archduke could also value, for such a masterpiece of contrasted light and shade as "Moses and the Burning Bush" by Domenico Feti comes from his collections (page 766). But the greatest artist of his generation, the supreme master of realism and chiaroscuro, Rembrandt van Rijn, he seems to have been incapable of appreciating.

Nor did the archduke buy for his collection the work of another genius of his time, Velázquez. In this case, however, portraits flowed to the court of Austria from the court of Spain, for reasons of high policy. Canvases by Velázquez portraying four of the children of Philip IV have been lent from Vienna for the exhibition.

Margareta Teresa, whom two of the portraits show at the ages of three and five, was married at 15 to the Emperor of Austria, Leopold I, who was the nephew of Leopold Wilhelm and for a time his ward. Velázquez also portrayed her elder sister Maria Theresa (page 745), who married Louis XIV.

All but one of the sons of Philip IV died young. Two of these hapless princes, Baltasar Carlos and Philip Prosper, sat to Velázquez for magnificent portraits which can be seen in the exhibition (page 755); but the one son destined to reach the throne, Charles II, had to be satisfied to pose for Juan Carreño de Miranda, Velázquez having died before his birth.

In the full-length portrait of Charles II, which has been lent by Countess von Harrach, his robes, like his role in history, seem too big for him.

Vermeer's "Artist" Most Valuable

Though almost all the paintings lent from Vienna were acquired by the Hapsburgs, the most valuable picture in the exhibition, "The Artist in His Studio," by Jan Vermeer, belonged to the Czernins, a distinguished Bohemian family whose taste was formed at the Hapsburg court (page 741).

This canvas, which was bought a century and a half ago for the equivalent of $100, Adolf Hitler, it is reported, acquired for 2,800,000 reichsmarks, or approximately $1,120,000 at the official exchange.

National Gallery of Art

Lifelike as a Photograph Seems Teniers's "Archduke Leopold Wilhelm Inspects Pictures in His Gallery in Brussels"

David Teniers the Younger (Flemish; 1610-90) painted himself showing the archduke (wearing hat) some recent acquisitions. Other artists include Canon van der Baren, the dwarf. Eight masterpieces now being exhibited in the United States are shown here.

A 400-year-old Tapestry Depicts Fame's Triumph over Death

In Washington's National Gallery of Art, a lecturer explains the symbolism of a picture in textile created by French or Flemish weavers.

The tapestry is one of six in the collection portraying the *Triumphs* of Petrarch, 14th-century Italian poet.

Fame, enthroned on a car drawn by elephants, is personified by a goddess with eyes, mouths, and tongues on her feathered dress, as described by Virgil. With a blast on a four-horned trumpet she sends forth her story to the four corners of the earth.

Accompanying Fame's chariot are Charlemagne, Plato, Virgil, Alexander, and other historical figures. The three Fates, symbols of death, lie prostrate beneath the wheels.

Elephants drawing the chariot recall Roman triumphal processions, which served as the theme for much medieval art. A cock and a bat, preceding the elephants, signify Fame's vigilance by day and night.

Tapestry weaving has been traced back as far as the Egypt of 1500 B.C. From the East the art passed on to Europe, where superior craftsmanship produced rich hangings for the walls of churches and palaces.

National Geographic Photographer
John E. Fletcher

John Horan, The Washington Star

When Royal Guests Said, "Please Pass the Salt," Even Strong Men Flinched

Benvenuto Cellini's gold saltcellar, made in the 16th century for Francis I of France, glitters as star of the Vienna show (page 756). It weighs about 15 pounds and measures 10¼ by 13⅜ inches. Tellus, Goddess of Earth, and Neptune, the Sea God, sit with intertwined feet to symbolize union of the two elements. Miniature triumphal arch held pepper; salt was in a boat-shaped receptacle on the opposite side.

The German Fuehrer intended the "Artist in His Studio" to be the chief glory of the museum he was building in Linz in honor of his mother. A handbook of the projected gallery was distributed to German troops with Vermeer's painting on the cover.

The foreword to this remarkable document has a certain charm. "Even to the expert it would seem impossible to think of inaugurating a new gallery at a time when almost all works of art are state-owned. . . But Hitler's great love of art was able to overcome all obstacles," the author states without a trace of humor.

The Fuehrer's "bold, decisive intervention," the introduction continues, "saved for Germany 'The Artist in His Studio,' a painting Mr. Mellon had offered to buy for $6,000,000."

Like most Nazi statements, this version of the amount offered by Mr. Mellon contains an element of exaggeration; but without doubt the price paid for "The Artist in His Studio," though more than 10,000 times the original cost, was a bargain.

Subsequently the picture was found by United States troops in a salt mine at Alt Aussee, Austria, the vast depository of looted art which Hitler intended for his museum at Linz. It was returned to Vienna by our Army as part of our restitution program. The Austrian Government immediately nationalized it and presented it to the Kunsthistorisches Museum in Vienna.

Henry W. Bolland, The Washington Post

With Regal Poise, Spanish Princeling and Dog Gaze from a Velázquez Canvas

Dr. Ernst H. Buschbeck, Vienna curator (right), explains the Infante Philip Prosper's girlish attire to Macgill James, assistant director of the National Gallery of Art. King Philip IV of Spain presented this portrait of his son to Emperor Leopold I of Austria in 1659.

The beauty of Vermeer's masterwork is breath taking. Its magical rendition of light, its subtle harmonies of warm and cool tones, its complex organization of color and detail, its unsurpassed expression of visual actuality in terms of paint—all these qualities are self-evident and need no comment.

Collection Grew Even in 20th Century

During the 18th century the private collections of the Hapsburgs were brought together to form something resembling a modern museum. At the beginning of the century they were concentrated in one wing of the Imperial Palace, but later they were transferred to a separate palace known as the Upper Belvedere.

The collection of paintings continued to grow, and gaps were filled by such great acquisitions as the "Madonna of the Rosaries" by Caravaggio (page 772), an altarpiece once presented to the Dominican church in Antwerp by a group of artists headed by Rubens; and Rubens's own paintings were lavishly purchased by Maria Theresa and Joseph II.

Even in the 20th century, between World Wars I and II, the Austrian Government found ways and means to add to the Kunsthistorisches Museum. Such an important painting as "A Dominican Saint Rescuing Pilgrims," by Guardi (page 768), a composition rare in this artist's work because of the large figures and dramatic theme, was acquired as late as 1931. However, purchases since the days of the Hapsburgs have not fundamentally changed the character of the collection.

In 1783, under the influence of the ideas that led to the French Revolution, the Belvedere Gallery was thrown open to the public. The art historian, Christian von Mechel of Basel, wrote in the introduction to his catalogue of the museum:

"The aim of all these endeavors has been to arrange a gallery that . . . should be, as much as possible, a source of instruction and a visual history of art. A great public collection of this kind, aiming at educational purposes rather than at passing pleasure, can be likened to a rich library, where he who is thirsting for knowledge will be happy to find works of every kind and of all periods."

The emphasis on education as the justification for a museum gives Christian von Mechel's introduction a modern tone. It is important, however, to remember that the collection he was presenting to the public had not been gathered by the Hapsburgs for "educational purposes." Instead, nearly every object in it had been acquired for a "passing pleasure."

An Artist Fights Off Four Robbers

The great saltcellar of hammered and cast gold which was made by Benvenuto Cellini for Francis I of France was certainly not commissioned for educational purposes (page 754).

Cellini describes in his autobiography how the king said to him "with a pleasant cheer, that having now so fine a basin and jug of my workmanship, he wanted an equally handsome saltcellar to match them." Francis arranged for Cellini to be given a "thousand crowns of good weight and old gold."

Then follows the famous description of Cellini's fight with robbers, as he carried the gold in a basket on one arm and drove off his assailants with the other.

Arrived at his lodgings, Cellini called to his apprentices, vaunting: "Those cowards yonder, four against one man alone, had not pluck enough to capture a thousand golden crowns in metal, which have almost broken this arm of mine. Let us haste inside and put the money away; then I will take my big two-handed sword and go with you whithersoever you like."

Finally the saltcellar was finished, and Cellini presented it to His Majesty, who "uttered a loud cry of astonishment, and could not satiate his eyes with gazing at it."

Fortunately for us, this saltcellar was later presented by Charles IX of France, grandson of Francis I, to Archduke Ferdinand of the Tyrol, whose niece he married and who acted as proxy at the wedding. Had it remained in France, it would undoubtedly have been melted down to help finance the Revolution.

The Hapsburg treasure has survived in its entirety largely because Austria has so far escaped a really violent and prolonged proletarian uprising and has resisted, with wisdom and fortitude, the wave of Communism which has engulfed the rest of Central Europe.

The Roman Catholic Church, though reduced to an implacable guerrilla warfare with Moscow, has always, even in the dark days of Moslem expansion, held the fortress of Austria against the forces of the East. The religious objects sent from Vienna deserve, therefore, a special reverence as symbols of this agelong resistance.

Among these works of Christian art, one of the most venerable is the service for the Mass given by Count Berthold of Andechs to the Abbot Heinrich von Wilten in connection with the founding of the city of Innsbruck about the year 1160. It consists of a chalice for the sacramental wine, a paten for the sacramental wafer, and two tubes for drinking the wine. The set is made of silver gilt with niello inlays of Old and New Testament scenes (page 775).

Many of the secular objects in the exhibition also recall the role in European history of the Hapsburgs and their ancestors. An example is the oriental ivory hunting horn supposed to have belonged to Albert the Rich, who died in 1199 and was the grandfather of Rudolph I, founder of the Hapsburg dynasty.

There is the armor worn in the field by Maximilian I, Holy Roman Emperor, and the horse armor which he inherited from his father, Frederick III (page 738). So caparisoned, he fought with the League of Cambrai. There is the tonlet armor, so called from its broad skirt, or *tonnelet*, of his descendants, Ferdinand I and Maximilian II, designed for foot combat in the lists.

Among these Austrian treasures, too, are the helmet, shield, and pistols of the greatest collector of armor who ever lived, Archduke Ferdinand of Tyrol, who assembled at his castle of Ambras the weapons of his ancestors and "of the great warriors and heroes of our days and of the past," as he himself put it.

Poison-proof Goblet Poisons Princess

Through the wife of Maximilian I, Mary of Burgundy, the Hapsburgs also inherited the Burgundian Treasure. The unicorn sword shown in the exhibition belonged to Mary of Burgundy's father, Charles the Bold. The grip and scabbard are made from the horn of a narwhal, an arctic cetacean somewhat like a whale (page 750). Its long horn was often

TINTORETTO • Portrait of a Man in Armor

Building the Hapsburg art collection left the Archduke Leopold Wilhelm little time for military leaderships. While winning respect as a connoisseur, he gained notoriety as a consistent loser of battles, thus disappointing his father, Emperor Ferdinand II.

The archduke admired heroic figures. In acquiring Tintoretto's portrait of a self-confident warrior, he may have been paying homage to the kind of man he himself was never able to be.

The name Tintoretto was given to Jacopo Robusti because his father was a *tintore*, or dyer. He was known also as *Il Furioso* because of his speed and intensity. Some of his work suffered because of this very haste. Though his hundreds of canvases reveal inequality, many of Tintoretto's works attest that he came close to his avowed goal of combining Titian's mastery of color and Michelangelo's power over line and form.

SIR ANTHONY VAN DYCK (1599–1641), Flemish • *Samson and Delilah* (Judges 16)

Flemish realism softened by Italian influence is evident in Van Dyck's portrayal of Samson's breaking the bonds placed upon him by the Philistines while his betrayer looks on. The picture was painted about 1628, shortly after Van Dyck, ending a five-year stay in Italy, returned to Antwerp for further study under Rubens, his original tutor.

TITIAN • Danaë

The legend of Danaë, daughter of King Acrisius of Argos, inspired Titian to one of his greatest efforts in the portrayal of feminine beauty in warm flesh tints and opulent curves.

When an oracle prophesied that a son born to Danaë would be the means of Acrisius's death, the king imprisoned his daughter so that no man could woo or wed her.

But Zeus (Jupiter) invaded her chamber in the form of a shower of gold. She bore him a son, Perseus. Acrisius bound his daughter and grandson in a chest and cast them into the sea, but they floated safely ashore.

Perseus became a hero of Greek mythology. Among his feats were the slaying of Medusa the Gorgon and the rescue of his future wife, Andromeda, from a sea monster.

The oracle's prophecy was finally fulfilled when Perseus, hurling a discus in an athletic contest, accidentally killed his grandfather.

Titian was born in the Dolomite Alps. His genius was developed in Venice. Today his frescoes, altarpieces, and other works stand out among Venice's glories.

The artist's life span covered not quite a century. Even in his nineties, just before he was struck down by the plague, he was painting with vigor and skill. "Danaë" was painted when Titian was about 77.

ALBRECHT DÜRER (1471–1528), German • *The Martyrdom of the Ten Thousand Christians Under King Sapor of Persia*

This painting, one of the Nürnberg master's greatest, presents a lesson in history and geography. Against a stark background it portrays many forms of Middle Ages violence.

At spear point victims are being pushed off a cliff, some falling among thorns (upper left). Others are being beaten to death with rocks, clubs, and hammers. Two Christians hang from rude crosses (lower left). Bound captives, spared death, are led away to an unknown fate (upper right).

Purporting to show the massacre of Christians by forces under Sapor I, a 3rd-century Shah of Persia, the masterpiece actually reflects the fear of Dürer's contemporaries over an invasion by the Turks, who in the 15th century marched to the very walls of Vienna.

Dürer painted himself and a companion (fully clothed, center) standing in the midst of the carnage. To some, their attitudes suggest two connoisseurs of medieval torture.

In an earlier woodcut of the same scene, Dürer included a particularly grisly detail—Persians using a carpenter's drill to remove a Christian's eyes. In the painting, he substituted the crucifixion group. A banner in the artist's left hand bears his monogram and, in Latin, the information that the painting was made in 1508 by "Albertus Dürer, German." Colorful garb of the Persian leaders (lower right) contrasts with the somber clothing worn by Dürer and his companion.

Dürer's picture originally was painted on a wooden panel. It was transferred to canvas by a process requiring months of patient labor.

The famous Brueghel paintings of the Vienna Collections could not be taken on the American tour because they remained on wood. Extremes in climate here might have caused them to warp or blister.

© National Geographic Society 762

VAN DYCK • *Prince Rupert of the Palatinate*

The youthful soldier here portrayed was a friend of the Archduke Leopold Wilhelm, the Hapsburg prince chiefly responsible for the Vienna Collections. Rupert was a nephew of Charles I of England and the son of Frederick V and Elizabeth Stuart, King and Queen of Bohemia. Rupert's family was driven from the throne by Leopold Wilhelm's father, Ferdinand II, but the young men were held together by their love for art,

RUBENS • Portrait of the Artist

As revealed in his famous self-portrait, the Flemish painter was a shrewd citizen of the world. Not for him were artistic cold garrets; he enjoyed life as a wealthy Antwerp burgher and crony of royalty. Rubens painted for the Spanish and Austrian Hapsburgs, the French Bourbons, and the English Stuarts. Commissions piled up beyond his ability to fulfill, and his studio became a school for students from all over Europe. He also found time to advise his patrons on matters of diplomacy.

TITIAN • Pope Paul III Farnese

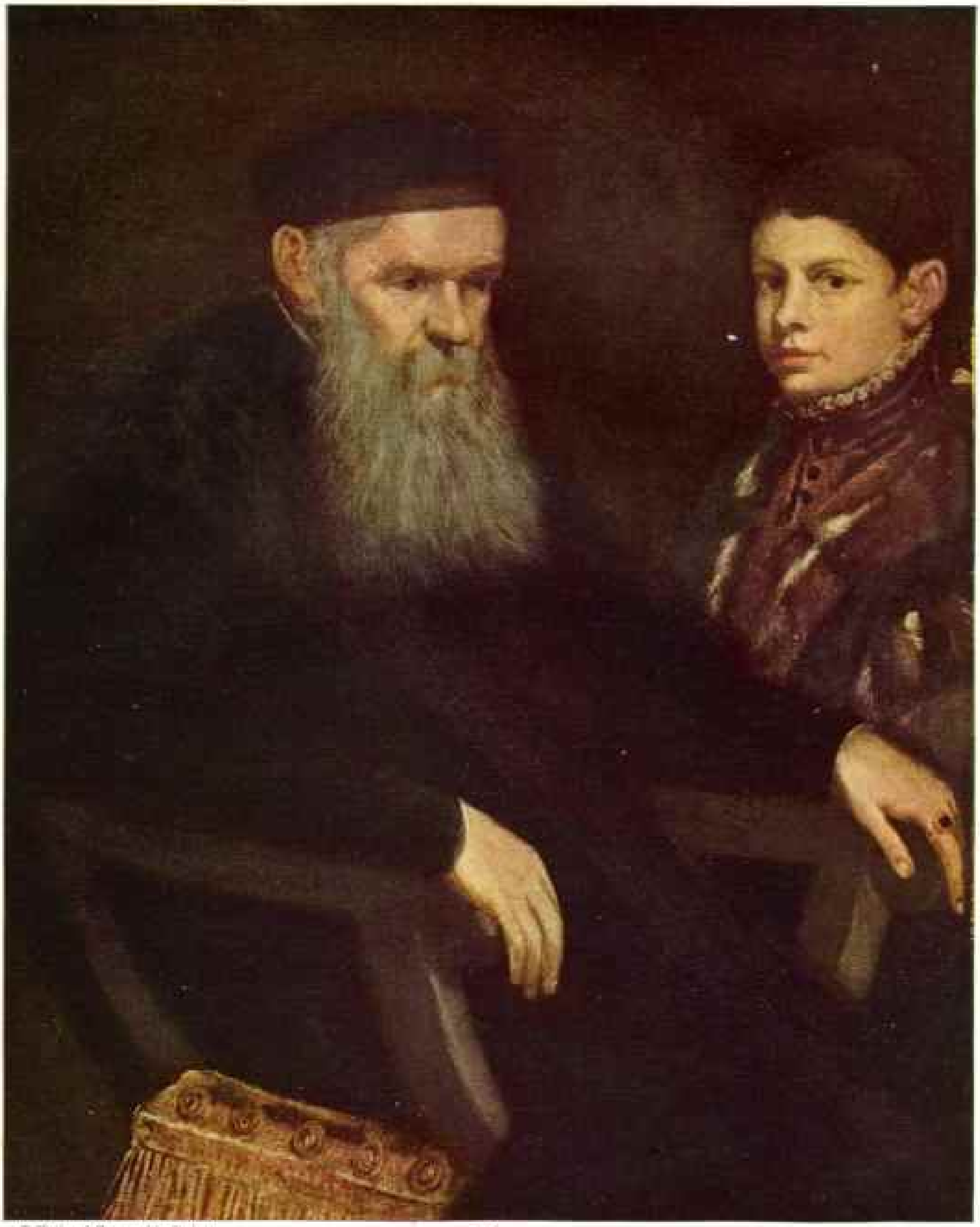
When 16th-century dignitaries sat for their portraits by Titian, they invariably received more than mere likenesses. By the magic of his brush, the Venetian master produced images that seemed to breathe. Viewers of these character studies almost expect the subjects to speak.

If mere canvas had voice, Pope Paul III might tell of high intrigue and princely life in Rome. Made a cardinal as the result of a family connection with Pope Alexander VI, he showed such astuteness and diplomacy that he became more influential under successive pontiffs. In 1534 he was elevated to the Papacy, succeeding Clement VII.

One of Paul's greatest works was his sponsorship and patronage of the Society of Jesus (Jesuits), largest single religious order of the Roman Catholic Church.

An art enthusiast, Pope Paul commissioned Michelangelo to paint the "Last Judgment" on a wall of the Sistine Chapel. He likewise encouraged the artist to complete the dome of St. Peter's.

Pope Paul founded the Farnese Palace, one of the finest examples of Roman Renaissance architecture, and was responsible for the rebuilding of many Roman streets.



TINTORETTO • Portrait of an Old Man and a Boy

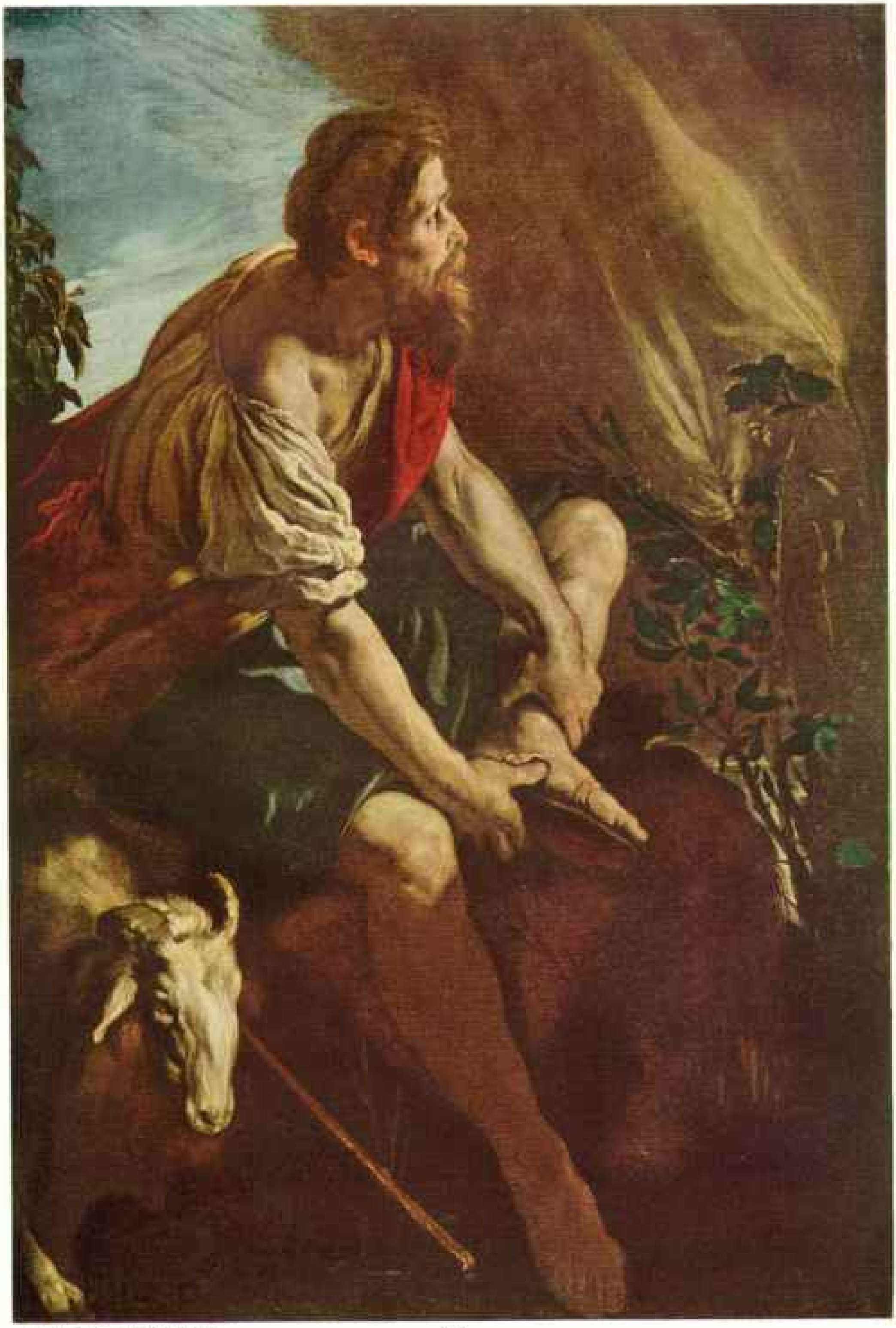
In this subtle characterization Tintoretto contrasts the tragedy of age with the promise of youth. Absorbed in his memories, the wrinkled and bent graybeard stares into space, while the youngster stands without thought for anxieties to come.

The models, who bear a strong resemblance, may have been grandfather and grandson.

Tintoretto, though he was an imitator to some extent, developed a powerful style of his own, but never attained the stature of Michelangelo or Titian, whom he greatly admired. He lacked Titian's easy, restful strength; and, where Michelangelo was austere and precise, Tintoretto was violent and impetuous.

Of his two idols, Tintoretto came closest to the Florentine. Indeed, he has been called the "Michelangelo of Venice."

Despite his headlong speed with the brush, Tintoretto's technique is marked by grace, strength of modeling, and marvelous contrasts of light and shade. He has been described as an artist who worked in the white heat of passion, with boundless imagination and invention.



DOMENICO FETI (1589?–1624), Italian • Moses and the Burning Bush (Exodus 3:2)

In this Biblical narrative, Moses is visited by the angel of the Lord, who "appeared unto him in a flame of fire out of the midst of a bush: and he looked, and, behold, the bush burned with fire, and the bush was not consumed." The artist, one of the more obscure represented in the Hapsburg collections, was a Roman who studied under Ludovico Cigoli. He was influenced by Adam Elsheimer, Paul Veronese, and Michelangelo Merisi da Caravaggio. From 1613 to 1621 Feti was court painter to the Duke of Mantua.

VAN DYCK • The Blessed Hermann Joseph Adoring the Virgin

Van Dyck, who is known chiefly for his portraiture, produced a number of religious paintings in which the influence of Rubens, his teacher, was clearly visible. He painted "The Blessed Hermann Joseph Adoring the Virgin" in 1630 for the Brotherhood of Bachelors of Antwerp, of which he was a member. Two years before his death Van Dyck surrendered his bachelorhood and married Lady Mary Ruthven in London. Almost 1,000 works of art are ascribed to him. England regarded the Flemish artist so highly that he was buried in old St. Paul's.

FRANCESCO GUARDI (1712–93), Italian • *A Dominican Saint Rescuing Pilgrims at the Collapse of a Bridge*

VERONESE • *Christ Healing the Woman with an Issue of Blood* (Matthew 9: 20-22)

JUSEPE DE RIBERA (1591?–1652), Spanish • Christ Among the Doctors

LORENZO LOTTO (1480–1556), Italian • *The Virgin and Child with Saints Catherine and James the Great*

MICHELANGELO MERISI DA CARAVAGGIO (1573–1610), Italian • *The Madonna of the Rosaries*

Caravaggio was a swashbuckling painter who, as founder of the naturalistic school in Rome, influenced contemporary and later art. He cast aside the idealistic tradition, as exemplified by Raphael with his fluttering cherubs, and painted in a vigorous, photographic style which drew many imitators. "Madonna of the Rosaries" was painted in Naples; models came from the city's streets and alleys.

passed off as that of a unicorn and, as such, considered a talisman.

There is also the court goblet of Charles the Bold's father, Philip the Good of Burgundy, who established the Order of the Golden Fleece. Perhaps from this beaker he may have toasted Joan of Arc, with whom he formed a temporary alliance for the destruction of the English, a betrayal which Shakespeare so bitterly commemorates in the lines in *Henry VI:* "Done like a Frenchman: turn and turn again."

The goblet is cut out of rock crystal, a transparent quartz, once considered ice from the highest mountains, frozen so hard that it would never melt. It was supposed that poison poured into rock crystal would turn milky white, thus safeguarding against treachery.

Ironically, it was rock crystal itself, however, which poisoned the great-granddaughter of Philip the Good, Margaret of Austria. She was the aunt of Charles V and for 23 years acted for him as the shrewd and able ruler of the Netherlands.

One night when Margaret's maid in waiting was bringing her a drink, the crystal jug fell to the floor and broke. The pieces were picked up, all but one tiny sliver which was overlooked in Margaret's slipper.

When the princess put on the slipper, she cut her bare foot. Gangrene set in, and Margaret died of an overdose of opium given her by her physician before amputating her leg.

In the exhibition there are several 15th-century Burgundian crystals which doubtless belonged to the unfortunate Margaret. Especially fascinating is a jug which has a handle seemingly reworked or repaired at some time in the remote past. Could this perhaps be the fatal piece that fell and brought about the death of this great Hapsburg collector?

The Hapsburgs feared poison. As a safeguard, Rudolph II, the great-great-nephew of Margaret of Austria, had a number of beakers and goblets made of the most bizarre materials. One is fashioned from narwhal horn, that rare substance already mentioned (page 750). The ivory tusk of this sea mammal was popular because it was thought an excellent antidote for noxious drinks.

Another goblet in the exhibition is composed of an even more curious material, known as bezoar, a concretion found in the alimentary organs of certain ruminants. The word itself in archaic French means "protection from poison." Bezoar was also considered a remedy against infectious diseases, the penicillin of its time!

Though our medicines have certainly improved, their containers have become less precious. The most costly box for ointment ever made is still an unguent jar cut in the 17th century, by a family of jewelers known as the Miseroni, from the largest emerald in the world.

This box, however, like the best pharmaceutical containers today, is really American, for the emerald was part of the booty sent back to Europe after the conquest of the New World. So this is its second transatlantic crossing.

When the emerald jar is returned to Vienna this time, it will be to the Austrian Republic and not to the descendants of the Hapsburgs, its original owners; for the Hapsburg throne is now merely a museum exhibit. Its woven hangings are part of the vast stock of tapestries, some 900 in number, kept in a depository in Vienna, whence a few have been sent for the passing adornment of the walls of American museums (page 753).

Treasures Buried in Mountain

All these treasures of the Hapsburgs, "fairer to see than marvels," were for a time transferred to the inappropriate custodianship of the former Austrian paper hanger who led the Nazi career of crime. The holocaust he precipitated caused them to be buried deep in a mountain.

When retribution was close behind them, Hitler and his gauleiters tried to destroy a large part of the artistic heritage of the world—all that has come to America in this exhibition and infinitely more. Fortunately their plans failed, but the escape of this treasure was a dramatic event of the war.

I have told part of this story in an earlier number of the NATIONAL GEOGRAPHIC MAGAZINE, but at that time I mentioned only the loot taken from France, Belgium, the Netherlands, and Italy. However, the fate of this booty and the fate of the Austrian treasures were really interlocked, for all were stored in the same Austrian mountain, which is honeycombed with salt mines.*

On the eastern side of this mountain, at Alt Aussee, the Germans had buried thousands of paintings, masses of sculpture, arms, armor, furniture, tapestries—every form of art, almost all of it stolen.

"The Artist in His Studio," by Vermeer, was hidden there side by side with the greatest of all Flemish paintings, the Ghent altarpiece by Hubert and Jan van Eyck, such masterpieces of sculpture as the Bruges "Madonna and Child" by Michelangelo, and some of the great paintings from Italian museums.

* See "Europe's Looted Art," by John Walker, NATIONAL GEOGRAPHIC MAGAZINE, January, 1946.

Gene Jones, The Washington Post

A Blind Art Lover "Reads" the Face That Launched the Spanish Armada Against England

Miss Gretta Griffis (right) applies the touch method to a bust of King Philip II of Spain. Mrs. Dorothea P. Michelson, National Gallery docent, aids her. Miss Griffis asked if Philip's bulldog jaw indicated unhappiness. Pompeo Leoni made the head of enameled cast silver in the 16th century.

Harry Goodwin, The Washington Post

Their Problem: Unloading 30 Tons of Europe's Most Precious Art Works

Commander Keith Merrill (left), in charge of the cargo, confers with Lt. Comdr. John D. Garland, *U.S.S. Malabar* skipper, and Dr. Ernst H. Buschbeck and Dr. Erich V. Strohmer, Vienna curators.

National Gallery of Art

Through Silver Straws, Worshipers Sipped Communion Wine from the Wilten Chalice

German artisans fashioned this silver-gilt eucharistic service about 1160. Count Berthold IV of Andechs, when he acquired monastery lands to found Innsbruck, presented the set to Abbot Heinrich von Wilten. Decorations in niello, or inlay, on the chalice show Old and New Testament scenes, the four rivers of Paradise, and the four cardinal virtues. The paten, or plate, used for bread, also bears religious motifs.

The provincial gauleiter, on orders probably from Hitler himself, prepared to blow up the whole mine. Bombs were actually placed in the chambers, ready to be set off. These, however, were surreptitiously removed by the Austrian salt miners; and, to make it impossible for the SS troops to re-enter, several were exploded at the entrance, thus sealing up the mine and saving its contents.

For the past four years, under the direction of our Military Government, these treasures have been steadily flowing back to the countries whence they were taken, until now nearly everything of importance has been returned.

In July, 1945, I visited Alt Aussee to report to the State Department on measures for the return of this vast reservoir of booty. From Alt Aussee one of the Monuments, Fine Arts and Archives officers of the United States Army motored me to the opposite side of the mountain, to Laufen, near Bad Ischl, where the Viennese treasures were buried.

An Austrian curator took us into the bowels of the mountain, then into a rickety elevator. In the darkness we ascended about the equivalent of six stories and entered a vestibule. From here we could dimly discern long corridors lined with unboxed pictures or piled with packing cases.

These were the Vienna collections. We missed, however, the great Brueghels, Velázquezs, Rembrandts, Titians, and Dürers which had been sent to the mine from the Kunsthistorisches Museum.

Masterpieces Captured by Americans

On inquiring, we were told that storm troopers had arrived, shortly before the collapse of the German armies, and in the middle of the night had held up the curator with tommy guns and forced him and his assistants to load trucks with the cream of the collection of paintings. They had driven off, saying that they were going to put the pictures in tanks and fight with them to the end. After that the curator had no idea what had happened.

Actually, the storm troopers headed for Switzerland with their swag, but fortunately they ran head on into the American Army. Our soldiers captured the pictures, which were sent into Salzburg. All this we learned later.

The next day we arrived in Salzburg, where we asked the property control officer, a most efficient and able executive, whether our Army

Thomas W. Kelley, The Washington Post

An Expert Appraises the Michael Goblet, a King's Gift to an Archduke

Dr. Erich V. Strohmer, Vienna museum curator who accompanied the Austrian art works to America, holds a goldsmith's masterpiece adorned by pearls, diamonds, rubies, and enamel. With Dr. Strohmer are Macgill James, assistant director of the National Gallery of Art, and Hans Thalberg, secretary of the Austrian Legation. Charles IX of France presented the goblet to Archduke Ferdinand of the Tyrol in 1570.

had picked up any works of art. He said he had a lot of pictures in an old warehouse, which he was guarding very carefully. He would be glad to show them to us, but he had no idea what they were.

When we entered the warehouse, which was magnificently policed, he showed us with some anxiety $5,000,000 in gold, which the Army had also captured, and afterwards took us to see the paintings.

There they were—the greatest of the Austrian pictures, some of the finest paintings in existence, unboxed, and, miracle of miracles, unharmed! They had been driven, in open trucks, through the retreating Nazi army and abandoned at St. Johann in the Tyrol, a few minutes before the arrival of the vanguard of Americans; yet they had not suffered a scratch!

I picked up each canvas or panel with indescribable emotion and restacked them all.

The property control officer said, "These must be important."

I replied that he was worried about $5,000,000 worth of gold, but his real responsibility was more than $80,000,000 worth of paintings. When he came to see these works of art at the National Gallery in Washington a few months ago, he told me I had given him a bad case of shock, complicated by insomnia.

From the warehouse and the salt mine on a wintry day just before Christmas, 1945, these treasures were loaded on a train and taken to Vienna. Subsequently a part of the collection was shown in the Hofburg, and a Viennese newspaper of December 20, 1945, wrote of "General Clark's wish to give Vienna and Austria the exhibition at this particular time as a special Christmas surprise."

The return of these collections to the Austrian people was more than a Christmas surprise. It was a symbol of the rebirth of art after the long winter of war. Once more, as Louis MacNeice wrote in honor of the reopening of the National Gallery in London:

> The kings who slept in the caves are awake and out,
> The pictures are back in the Gallery; Old Masters twirl their cadenzas, whisper and shout,
> Hundreds of windows are open again on a vital but changeless world—a daydream free from doubt.

Roaming Korea South of the Iron Curtain

By Enzo de Chetelat

IMAGINE the United States divided into North and South by a border from east to west at about the latitude of San Francisco, with a Communist curtain over the North and guerrillas raiding the South. Then you will have some idea of the difficulties faced by Korea.

The arbitrary division into Northern and Southern Zones, which began as a military expedient for disarming of Japanese troops by American and Russian forces, became Korea's real tragedy.

Now turned into a rigid political barrier between Communist-dominated northern and democratic southern Korea, the 38th parallel cuts across villages, mountains, streams, roads, and the country's resources (map, page 779).

North Korea is rich in minerals, timber, and hydroelectric power; here was concentrated heavy industry. South Korea is the food-producing half, though it also has some industry and mineral resources. It is primarily agricultural, has well-developed fisheries, and contains the capital city, Seoul.

Trains, Mines, Industries Going Again

As I viewed the problem at close range, the difficulties in the way of the new free government at Seoul seemed almost insuperable. But, comparing Korea's present condition with the complete disruption which it faced at first, one sees striking progress.

Assisted first by American Military Government and later by the Economic Cooperation Administration, South Korea today is getting its railways repaired and its trains running on schedule.*

Short extension lines are being built in the South to tie in the tungsten, coal, and other minerals of the east coast district which formerly fed Japan's war industries (page 790). Mine operations are being extended and new mineral deposits opened.

There is still a shortage of electric power, but steam facilities are being expanded and new hydroelectric projects are under way. Industries that were completely halted when Russia turned off the power from the north (page 795) have again started to run; so there are more cotton cloth, paper, bicycles, and other products to supply local needs.

Thanks to imported fertilizers, the heavy importations of grain have declined. The Seoul Government and ECA estimate that, barring unforeseen disasters, the 1950 rice crop will supply South Korea's own needs and also should yield a surplus.

When, in January, 1948, I was asked to go to South Korea as adviser to the chief of the Geological Survey of Korea, my feelings were mixed. I had heard that the country afforded difficult living conditions for Americans. Friends and family advised me not to go there because of the proximity of the "Iron Curtain." But my curiosity and eagerness for travel soon overrode my hesitation.

Seoul a Crowded Capital

Two months later I stepped ashore at Inchon, busy port about 20 miles east of Seoul (page 794).

The Korean capital was crowded. The population had practically doubled in the last 10 years. Since the war there had been a heavy influx of refugees from the Russian Zone and Korean repatriates from Japan, China, and islands of the Pacific. Materials were short during war years and since; every house and building needed repair and a good coat of paint.

Seoul is beautifully located in the midst of steep granite hills. Wide avenues give it a Western atmosphere, as do the many new modern buildings built when Korea was part of the Japanese Empire (pages 778, 782, 783). But many of its streets are unpaved and bordered by humble shops.

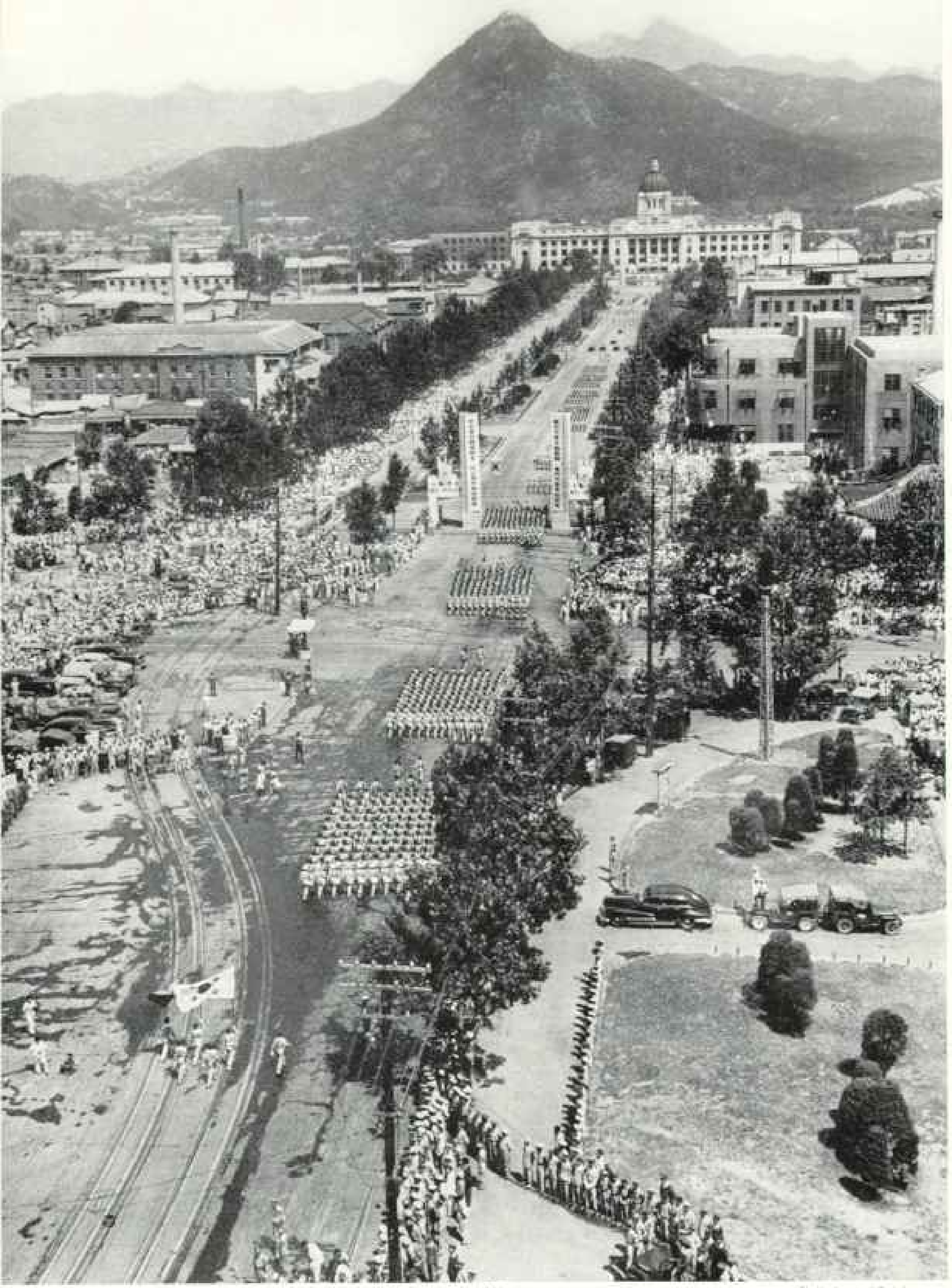
Oddly assorted vehicles clogged avenues and narrow streets—oxcarts; dilapidated Japanese three-wheeled cars and motorcycles; gaily painted buses drawn by gaunt horses; rickshas; flashy new American cars of high Korean officials; U. S. Army staff cars, jeeps, and trucks; and streetcars bursting beyond capacity with passengers hanging from the steps.

Traffic policemen, like those of Japanese cities, were as busy as ballet dancers. Their dramatic gesticulations looked like a ballet version of an American policeman directing traffic.

Seoul's male population wears mixed garb, part Western and part Oriental. In contrast are the women's dresses, their style unchanged for centuries. Those of older women are white, with embroidered velvet bonnets; younger women and girls have long high-waisted skirts and short bodices in pastel colors—pink, robin's-egg blue, and aquamarine. Many mothers carry babies slung on their backs in bright red and green quilts.

Here, too, are schoolboys in high-collared jackets and caps, children in bright-yellow

* See "With the U. S. Army in Korea," by Lt. Gen. John R. Hodge, National Geographic Magazine, June, 1947.



778 U. S. Army, Official

Korean Armed Forces Parade in Seoul to Celebrate the Republic's First Birthday

Army and Coast Guard units swing along the wide avenue to the domed, Jap-built capitol. Ceremonies recalled August 15, 1948, when U. S. Army officers transferred power to newly elected Korean officials (page 796).

and red dresses (page 804), and ragged coolies carrying tremendous loads on wooden racks strapped to their shoulders.

Seoul Bursts into Bloom

During my first few days in Seoul the weather was still cold and the trees barren. A week later, as if by a sudden explosion, everything burst into bloom. Masses of yellow forsythia were succeeded by snow-white cherry blossoms.

The city has several fine parks, such as the Royal Gardens, Pagoda Park, and the capitol grounds, landscaped with ponds, pavilions, and centuries-old monuments. The temples show how Korean architecture has been influenced by the Chinese for more than a thousand years.

Fifty yards from my Quonset hut in a park was a sleepy pond where stood the ruins of an elegant octagonal-shaped pavilion in Korean-Chinese style.

Drawn by Theodora P. Thompson and Irvin E. Ahlman

A Nation-splitting Boundary Is Modern Korea's Tragedy

Potsdam Conference, in July, 1945, established the 38th parallel as the Korean boundary between U. S. and Russian forces. This political frontier cuts across villages, streams, and roads. Heavy industry is concentrated in North Korea, rich in minerals, timber, and hydroelectric power. The South, chiefly devoted to farming and fishing, is the food-producing half.

Once settled, I reported for duty as adviser to the Geological Survey. I was well received by the director, Dr. Park Dong Kil, a learned, quiet gentleman who did his best, with the little means at his disposal, to facilitate my work in Korea. The Geological Survey had a personnel of about 50.

After the Japanese occupation at the beginning of the century, Japan realized that Korea could be an important source of materials in her plans for dominating the Far East.* In 1919 the Geological Survey of Chosen (Korea) was organized. Laboratories and libraries were set up in a group of modern buildings overlooking the Han River five miles west of downtown Seoul.

Japanese geologists and engineers explored all Korea to locate and develop mineral deposits. Coal, copper, zinc, lead, graphite, and tungsten deposits were developed. The gold industry was heavily subsidized, and all Korea produced more than 27 metric tons of lode and placer gold a year in the period preceding World War II.

Koreans Trained to Replace Japanese

To save foreign exchange, the Japanese worked the mines under the autocratic system used in other totalitarian countries, and pro-

* See "Jap Rule in the Hermit Kingdom," by Willard Price, National Geographic Magazine, October, 1945.

duction costs were not taken into account. Many of these mines opened by the Japanese cannot operate profitably in a competitive world market.

During her 40-year occupation, Japan allowed few Koreans to hold important jobs. After the defeat of Japan in 1945, all Japanese in South Korea were sent back home. There was a shortage of trained technicians, foremen, and administrators to run the country. Whole corps have had to be trained.

Koreans are extremely intelligent and charming, but highly individualistic. I found them cooperative and efficient if allowances were made for the etiquette and procedure of the Far East. They are always afraid of losing face.

The worst mistake an American could make in dealing with them would be to criticize them in front of equals or subordinates. A Korean thus offended would never forget the insult.

5,000,000 More Mouths to Feed

One of the country's biggest problems is overpopulation, without enough tillable land available for more crops. Before the war, Korea south of the 38th parallel had about 15,000,000 people—in an area roughly the size of Maine. There are more than 20,000,000 now. The big increase in less than ten years is due to the high birth rate and the influx of refugees and repatriates.

The American occupation forces did an excellent job in taking care of the refugees by checking and improving sanitation, by vaccination, controlling the drinking water, and conducting delousing campaigns. During my stay I heard of no serious epidemic of cholera, typhus, or other infectious disease. Ironically, however, these measures aggravated the problem of overpopulation!

Geographically, this peninsula country presents two contrasting faces.

The west coast has a partly submerged shore line with almost fjordlike bays and many islands. The waters of the Pacific Ocean rush into the Yellow Sea, causing high tides which fluctuate up to 25 feet and more, and have created broad tidal mud flats.

The east coast has a straight, steep shore line. Mountain slopes plunge precipitously to the sea or form narrow beaches. Here the water, instead of being muddy as on the west coast, is clear and ideal for swimming.

The contrasting east and west coast features indicate that Korea has been tilted down on the west and up on the east. As a result of this tilt, the principal drainage divide is parallel to the east shore and only about 15 miles inland.

Small, short streams descend abruptly to the Sea of Japan. Rivers reaching the Yellow Sea, however, meander tortuously through several chains of mountains.

Peering Past the Iron Curtain

I arrived in Korea two months before election of the new free government took place, on May 10, 1948, under United Nations supervision. Much to my satisfaction, I was made a civilian observer.

A temporary United Nations Mission for Korea, sent out in January that year, was refused permission by the Russians to investigate North Korea.

In the Southern Zone, the American Military Government gave all facilities to permit the Korean people to have a really free election. Two American civilian observers were sent to each *gun*, which corresponds to a county in the United States.

Before leaving Seoul, we had been given orders to refrain from interference in these elections in any way whatsoever. We were merely to observe and report any irregularities.

I was lucky in being assigned to one of the most scenic sections of Korea, the Kangwon Do. This *do*, or province, cut almost in half by the 38th parallel, is very mountainous and one of the few regions in South Korea which still have tracts of virgin forest.

We left Seoul in a convoy of jeeps and trucks and arrived the same evening in Chunchon, capital of the province, only eight miles from the Russian line. I had opportunity in the course of my stay to go to the 38th parallel, but I saw no Russians. The men I saw in the distance were probably Russian-trained North Korea soldiers.

Election Postponed Because of Eclipse

On May 7 I left Chunchon by jeep with a young GI driver from Alabama, a Korean interpreter, and two cases of Army C rations. We arrived late that evening at Pyongchang, a typical small Korean town, seat of the Pyongchang gun, where I joined another American civilian.

We slept in Korean fashion on the floor in the house of the district governor. Not being accustomed to sleeping with only a quilt over a straw mat, I found the first night rather hard on my bones.

The following morning I started early and inspected all the voting polls in the northern part of the gun. Every man was busy that day, helping set up voting places. For the first time in Korean history a free election was to take place, and everybody recognized the importance of the event.

Feather Pompon on Swivel Button Gyrates Madly When a Korean Dances

Most of the year this man tills his rice fields, but in the off season he joins other farmers in performing old folk dances for community entertainment.

Many of these dance routines consist of complicated steps requiring skill and endurance. They go on for hours to the accompaniment of throbbing drums and clashing gongs.

The dancer's gold teeth, capped by a Japanese dentist, flash when he smiles. He wears the rainbow-hued banded sleeves favored for children's festival costumes, brides' gowns, and robes of professional women entertainers, known as *kisang*.

Korean kisang occupy a position like that of the Japanese geisha. Girls are trained from childhood in the art of entertainment. They learn to provide music, dancing, and pleasant conversation at parties and banquets attended by men, who leave their dutiful wives at home.

During the 40 years when Japan controlled the country, little effort was made to make the people more than servants of the Empire. Improvements were introduced only when they would serve Japan.

Though freed of Japanese rule, Korea remains a house divided, for separate governments exist on each side of the 38th parallel, the postwar boundary established when the American and Soviet forces drew up their zones of occupation.

During the occupation of South Korea, American Military Government officials served as advisers until Koreans were trained to conduct political affairs.

United States Military Government terminated in August, 1948, and the last of our occupying forces withdrew in June, 1949. However, the Republic retains an advisory military mission of some 500 persons to help train its security forces.

Stars and Stripes and Hammer and Sickle Flank the Korean Emblem at Duk Soo Palace, Seoul

Meetings held here by the U. S.-Soviet Joint Commission ended in stalemate. In 1948 the Republic of Korea was set up under auspices of the United Nations.

Built for Japanese, Seoul City Hall Now Serves Koreans

The Republic's flag (right) embodies ancient symbols of the Orient. Its circular pattern, called *tae guk*, is made up of comma-like halves, one red, one blue. They represent the mythical *yang* and *yin* principles, familiar in ancient Chinese art and literature, which express the opposites in Nature—male and female, heaven and earth, fire and water, summer and winter, construction and destruction.

Trigrams in the four corners made up of broken and unbroken black lines likewise carry the idea of opposites and of balance. Three unbroken lines (upper left) stand for heaven; broken ones (lower right) represent earth. In the upper right, two solid lines with a broken line between (not shown) symbolize fire; the one diagonally opposite signifies water.

These trigrams have many supplementary meanings, and by some are taken to connote the unity of the Korean people.

Korean words above the door are written in a phonetic alphabetical script, not in ideographic characters as in Chinese. The alphabet consists of fourteen consonants and eleven vowels.

Newspapers utilize a combination of both Chinese characters and the native language, but the Chinese ideographs are being eliminated.

Korean children are now being taught their own language, which was outlawed during Japanese rule.

Kodachrome by Ray Ellman

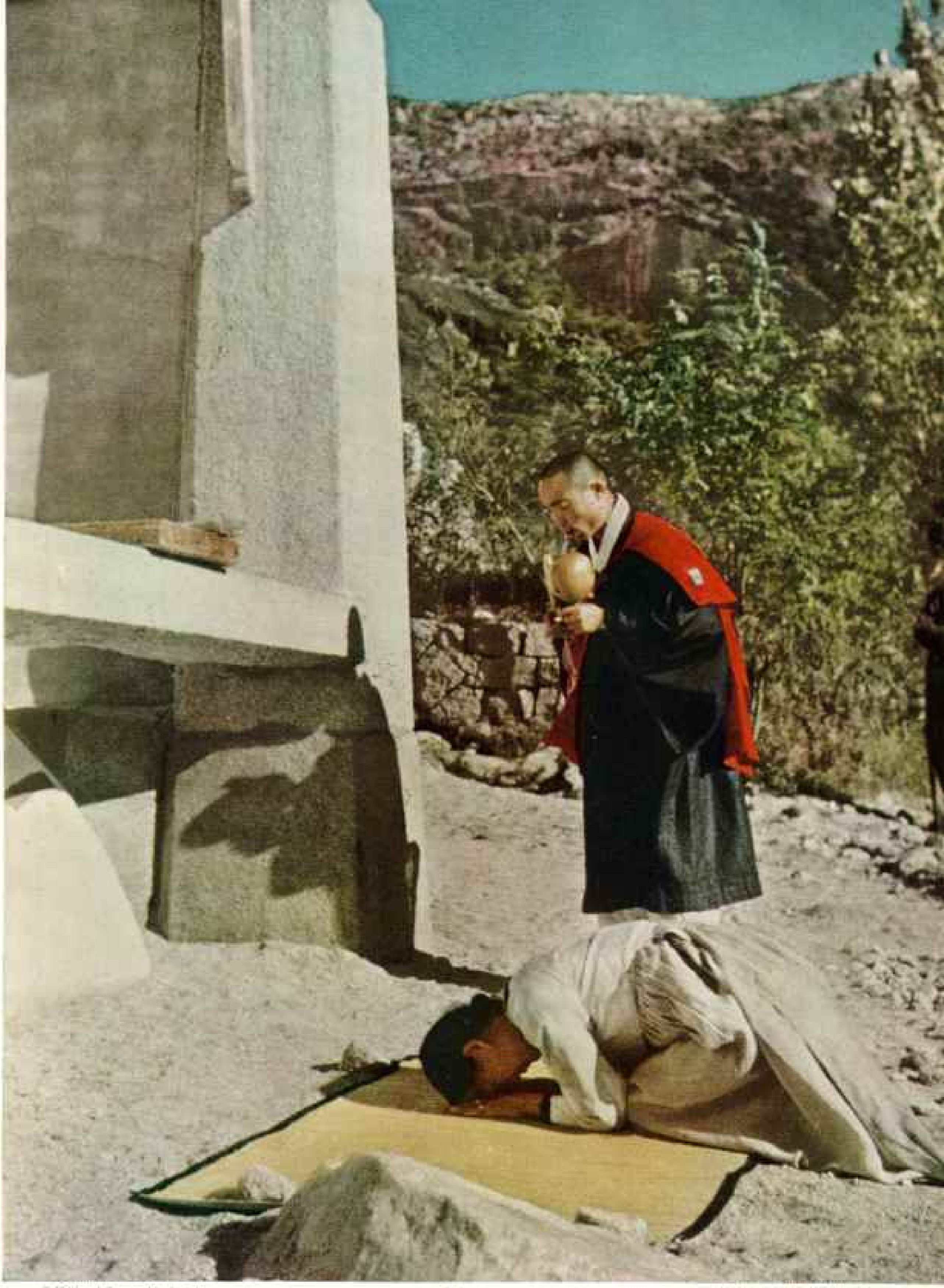
↑ Husband Wears Western Garments; Wife Clings to Antique Dress

This young couple walks the dusty country road because transportation is inadequate. They drink at a roadside well, Korea's refreshment stand. The woman's voluminous skirt is carried at armpit level and covered with a brief jacket.

↓ Youngsters Bloom in Bright Silks for a New Year's Festival

In some country districts the New Year is celebrated in late January or early February, in agreement with the old lunar calendar. These children (one melancholy boy in brown among seven girls) clutch candles, the photographer's gift for posing.

Kodachrome by James P. Lockard, Jr.



Kodachrome by Rae Gilman

Chanting Priest and Prostrate Woman Worship at White Buddha Shrine near Seoul

As he recites his prayer, the priest taps a rattle to attract the god's attention. The shrine has received a food offering (tray on shelf). Confucianism is Korea's most popular faith, though Buddhism appeals to many women.

Thatched Farm Homes and Green Rice Terraces Snuggle in Narrow Valleys Between Folded Hills

Headbands, Plumed Hats, and Bright Sashes Transform Farmers' Everyday Dress into Dance Costumes

Originating in ancient days as simple rites to celebrate festive occasions, some farm folk dances have grown into energetic routines through the addition of more complicated steps.

Some farmer-dancers have almost a professional status; and, when not busy caring for their crops, they travel in troupes from village to village, giving performances and competing against other teams.

At left, a drummer beats a rhythm on an hourglass-shaped long drum.

Strange to Western Eyes and Taste Are the Dishes Prepared by Korean Housewives

The girl spreads rice, dried fish, bean curd, sliced turnip, and the national dish called *kimchi*, a spicy mixture of cabbage flavored with garlic, ginger, red peppers, and broth. Women ladle soybean sauce (left) and rice.

On the morning of May 9, we were treated to an eclipse of the sun. In fact, the elections had been postponed one day because of that event.

Earlier I had visited the site near Chonan where an expedition, sponsored by the National Geographic Society, had been set up to observe the eclipse.*

As we passed through a village, people were looking at the eclipse by watching the reflection in streams or pools. When I suggested that it would be much better to use smoked glass, the whole village went hunting for broken glass.

That day I visited a school and talked with the electoral committee about setting up the polls. When I came out, the American driver had disappeared with the jeep.

For a few minutes I was worried, but at length saw the jeep kicking up a swirling cloud of dust. The driver had been unable to resist the pleas of the village children to give them a ride. It was against Army rules to seat more than four people in a jeep, but in this I counted 17 youngsters, all having a marvelous time (page 792).

Communist Raider Killed at Polls

At 8 o'clock the following morning, May 10, the polls opened. I had to inspect about 25 voting places. Each was decorated with gay banners and Korean flags (page 783), and everybody, even the sick and the aged, turned out.

In front of each booth were photographs of the four candidates of the district with the corresponding symbols, I, II, III, IIII, like bars, placed above them. The ballots had four columns, each headed by a bar symbol, and the voter had only to mark a cross in the column that corresponded to his candidate (page 793).

Women not only were free to vote, but were encouraged to do so. However, there was a typical example of Korean compromise. Most polling places had special lines for women, and they were the first to vote. By 9 o'clock most of them had already gone back home to attend to domestic duties. The men voted at leisure until 5 p. m., when the polls closed.

We had been instructed to make sure that a secret voting space was provided, to see that the voting boxes were sealed, and also to report any fraudulent actions or disturbances at the polls.

The only serious incident in my gun that day was the reported shooting of a Communist by Korean police at Poll No. 42.

When I reached the spot, in a thick forest, several Korean policemen told me that the Communist had just been buried. During the previous night a band of roving troublemakers had come south from the Russian Zone and clashed with a Korean patrol.

Whole Convent Turns Out to Vote

Returning from Poll No. 42, I saw a line of a dozen persons wearing white or gray robes walking the mountain road with their hands clasped as if in prayer. Because of their shaven heads, I first took them for men, but the interpreter informed me that they were Buddhist nuns. The Mother Superior was leading the whole convent to the polls!

Through my interpreter she asked if I would visit the nunnery near by and the Buddhist pagoda of Ohdea San.

This temple was a jewel of early Korean architecture. The setting was a large tract of forest of huge pines and spruces, large oaks and maples, starting to bud. There was a rushing stream with banks bordered by wild azaleas.

The Mother Superior told me that she wished the United States forces would stay in Korea. She said the beautiful religious properties and monasteries in the Russian Zone had been confiscated and the timber surrounding every Buddhist temple felled.

The Korean people on the whole are not highly religious. Buddhism, powerful up to the late 14th century, has lost much of its influence. Many of the better-class Koreans try to follow the rules set down by Confucius. Buddhism appeals more strongly to the female population, but is distorted by many superstitions (page 785).

The average Korean, excluding the Christians, believes in a mixture of spirit worship or animism, Buddhism, and Confucianism. Spirits dwell in everything. One of the most important groups inhabits the mountains.

Sake Flows Freely at Korean Banquet

Much of our time was devoted to supervising the balloting at the county seat of Pyongchang, where a full 99 percent of the registrants voted.

After the election we were invited by the electoral committee to a Korean banquet. It was my initiation into real Korean hospitality. Some 30 of us sat on the mat-covered floor in a large room with no furniture except long, low tables about a foot high.

My interpreter explained that in Korea it was impolite to refuse a drink. If anybody in the party offered a guest his cup, the guest had to accept it.

* See "Operation Eclipse: 1948," by William A. Kinney, NATIONAL GEOGRAPHIC MAGAZINE, March, 1949.

Robert A. Kinney

Manpower, Yoked to a Rope Sling, Moves Rocks to Build a Mountain Railroad

Chanting as they work, two-man teams carry boulders up to 600 pounds in this way. At left, Dr. Edgar A. J. Johnson, Director of ECA's Korea Program, watches one of the native "bulldozers" in operation. Built with ECA funds, the single-track road links an isolated east-coast mining area to the rest of South Korea through rugged country (page 777).

As all members of the committee began offering me their cups, I realized I should have to drink at least 30 cups of strong warm *sake* (rice brandy).

Fortunately I got a timely tip from one of the *kisang* girls, professional entertainers corresponding to Japanese geisha girls. I saw her touch her lips to the cup and dump the rest into a big can, used as an ash tray, hidden under the table. I followed her example!

How a Korean Farmer Lives

A few days later I visited the Sangdong tungsten mine, one of the most important deposits of this material in the world.

When the Japanese-built mill is reconditioned and new equipment is installed, the mine will provide Korea with a sizable source of foreign exchange through export of tungsten concentrates.

Traveling in a jeep, I stopped with my interpreter and Korean driver to eat our lunch near a sparkling mountain creek. Nowhere can a foreigner stop on a Korean road without being surrounded in a few seconds by dozens of children and later by staring adults.

A kindly middle-aged man invited us to his farmhouse to have our rations warmed up and to enjoy protection from the chill air of early spring. I accepted, partly to see how a peasant of this area lives.

My host was a fairly prosperous farmer living in a rugged, not too overpopulated, district. Unlike many sections of Korea, this area still has plenty of timber and wood for heating. As a rule, wood is extremely scarce, and every twig and leaf is used, either for heating or for making compost.

The farm had about ten acres of beautifully terraced rice fields, following the contours of the valley bottom. Every flat space of ground

U. S. Army Official

Bowed Heads and Deft Fingers Concentrate on 4-H Club Needlework

American Military Government planted the 4-H clover-leaf symbol in South Korea in 1946. By latest count, Kyonggi Province, where this picture was taken, has more than 24,000 boys and girls between the ages of 14 and 20 in its clubs. Contrary to Oriental custom, girls take a prominent part in the activities.

was under cultivation. It was the season when rice was being transplanted from seedling beds into flooded fields previously tilled with a primitive wooden plow and harrow pulled by a placid-looking bullock (pages 786, 800).

Soybeans, hemp, wheat, barley, and a variety of vegetables were cultivated in dry fields.

More than three-fourths of the population of South Korea is engaged in farming, and a farmer is virtually self-sufficient. In contrast to the urban population, he has no worries over food rationing and shortage of power.

The farmer raises his own food, and his womenfolk spin and weave cotton, silk, and hemp. Almost every village has a potter and a blacksmith. Protein is provided by soybean products, chickens, eggs, fish caught in the river, and a little game trapped in the woods. The farmer barters some of his products for dried and salted sea fish, matches, canoe-shaped rubber shoes, and tobacco (page 799).

His biggest need, of course, is fertilizer for his crops. Formerly, much of it was supplied from the North; with that source cut off, fertilizers must be imported from abroad. Temporarily, American aid has eased this urgent need, but the Republic is exploring ways to provide the bulk of its own requirements.

In most homes women and men have separate quarters, divided by a courtyard. The courtyard of this farm home was filled with tall jars of a wonderful brown luster. They are used especially to store pickled cabbage, a highly seasoned dish called *kimchi*, eaten at every meal (page 798).

The large sliding doors were covered with strong translucent paper to admit light. Glass in windows is virtually unknown in rural Korea. Extremely bare, the floors were covered only with springy matting or shiny oiled paper. Against the walls were beautiful old lacquered chests inlaid with mother-of-pearl and equipped with heavy brass hinges and

Ernie de Charlat

GI Joe Takes 17 Korean Youngsters for a Ride—All at Once!

Begging for a ride, the small fry besieged the driver while he waited for the author outside a village schoolhouse. When he said "O. K.," they quickly swarmed over the jeep, squeezing into every inch of space. Here, after their whirl up the dusty main street and back, they pose with driver and interpreters.

Acme

GI's Are Gone Now, but Latitude 38 Still Divides Korea

When the U. S. and Russia failed to agree on an all-Korea government, the U. S. sponsored an election in the South and transferred its power to elected natives. Russians set up their own régime in the North. More than 20,000,000 people crowd the Maine-size South; North's population is about half as large.

May 10, 1948: South Koreans Flock to the Polls for the First Free Election in Their Country's History

More than 92 percent of the registered voters cast ballots. Posted outside the village polling place at left are the likenesses of local candidates. Bars above the pictures, reproduced on ballots, aided illiterate voters. Right, a voter "signs" the election list with his thumb print before entering the secret booth. Women were encouraged to vote; most did so during the first hour. The author acted as an election observer in mountainous Kangwon Province (pages 780, 789).

793

Ernst de Chastel

U. S. Army Official

Lining the Dock at Inchon, Soldier-Husbands Eagerly Await Their "VIP's" from the States

The officers are members of the U. S. Korean Military Advisory Group, which helps train the Republic of Korea's security forces. They are gathered to greet their families—"Very Important Persons" indeed—arriving on an Army transport. Inchon, on Korea's indented west coast, is the port for Seoul, the capital.

locks. In them were kept the holiday dresses and family heirlooms.

Koreans in Mourning Wear White

We found our genial farmer's family dressed in cotton or stiff hemp cloth of white, the traditional color of mourning in Korea. An uncle had died the preceding year. Since white is worn for three years for close relatives, Korean families are in mourning much of the time.

The aged grandfather of the family was wearing an old-style horsehair hat. This hat consists of three parts: a bonnet made of horsehair net, worn all the time; a high horsehair hat, similar to a Welsh woman's headdress, perched atop the bonnet when out of doors; and a conical oiled-paper overcap for use in wet weather.

The old gentleman was smoking a yard-long pipe with a tiny brass bowl—just enough for a few puffs. When I gave him a cigarette, he tore the paper off and smoked the tobacco in his pipe. The one cigarette made three fillings.

The menfolk were dressed in white pantaloons and a short vest worn over a balloon-sleeved shirt. The women wore white high-waisted skirts much shorter than those I had seen in the town, and small narrow bodices which only partly concealed their breasts. Naked youngsters played in the courtyard or in the irrigation ditch near by.

The women brought our warmed rations and Korean dishes on low tables, bowed deeply, and disappeared. Peasant women never associate with men not of their own family.

Into Korea's Coal Country

One of my field trips was to study the geology of the Samchok anthracite basin near the coast of the Sea of Japan. This basin is the largest producer of coal in South Korea. Much of the fuel is a poor anthracite and hard to burn unless mixed with bituminous coal, but its use reduces imports of other fuels.

During its peak wartime year under Japanese operation, this mine had an output of more than 830,000 tons, roughly three-fifths of all the anthracite and lignite mined in South Korea. In this past year its production has been brought back to one-half of its peak level. With the assistance of our Economic Cooperation Administration, plans are being made for the installation of new crushing and grading equipment to remove waste material here at the source to cut transportation costs.

Coal from here is used to fire the near-by Yongwol power plant, largest single source of electricity in South Korea since the Russians, on May 14, 1948, pulled the switches and shut off two-thirds of the power South Korea normally uses (page 808).

En route to the mine, my Korean driver, unfamiliar with the road, missed a detour around a washed-out bridge. Fortunately, by swerving we landed in the embankment instead of the river. Although there were a village and several farmhouses near by, no one had bothered to put up a warning sign.

We wasted several hours before a Korean truck pulled us out of the hole. Since we could not reach the mine that evening, we stopped near Chechon at a native inn famous for its hot springs.

I eagerly availed myself of the luxury of a hot bath. Returning to my room along a veranda, I could not help seeing into three rooms where Korean parties were going full blast. They had all varieties of food, American and Korean whisky, beer, and kisang girls singing and dancing. I took for granted that the hosts were of some prominence.

To my astonishment, my interpreter told me that the "big men" were Korean truck drivers spending the night on the long haul from Seoul to Pusan. He explained that the truck drivers and big black-market operators were the only people in Korea who really were "in the money" at that time.

I was not surprised. Train schedules then were limited and bus service infrequent. Truck drivers thus could charge good prices for carrying innumerable passengers on top of their loads, a practice apparently tolerated by their employers.

Inflation Hard on Government Workers

In Korea I found the same inflation pattern that I had observed earlier in North Africa, France, and Italy. Inflation here is not so serious as in China, but uncontrolled prices, in terms of *won*, the local currency, have increased a thousandfold in less than ten years.

In the middle of 1948 the purchasing power of the won corresponded to more than 600 to a dollar, though the official rate of exchange was 50 won to a dollar. Few dollars, I was told, were exchanged at the legal rate. Private transactions between Americans and Koreans were generally based on cigarettes, soap, candy bars, whisky, and beer.

Although illegal, such transactions helped a lot of refugees, especially women and children, make a living. Hawkers profited a few hundred won a day by selling these black-market goods openly in the street.

Some inflation still exists. The official rate has since been raised to 900 won to the dollar, and unofficial transactions go on at a rate as high as 3,500 to 1.

Another effect of inflation, since corrected to some degree, was the plight of people with fixed incomes. This was especially true of Korean Government employees. Taking into account the basic food purchased at controlled prices, a man's salary often had a purchasing power insufficient to feed a family, even by Far Eastern standards.

How some of the Government employees subsisted was a mystery to me. Apparently some accepted bribes, some dug into capital, some held several jobs, while others were probably just starving. I saw several instances of serious underfeeding among the geologists and surveyors employed by the Geological Survey. They were either too honest or too proud to go in for briberies or the black market.

Bride's Face Masked with White Powder

In my many wanderings through South Korea I visited the town of Wonju. My host was a young United States Army lieutenant who was adviser to a Korean constabulary regiment. He had been invited to the wedding ceremony and banquet of a young Korean officer, and he took me along.

It was a typical upper-class marriage, which followed many old customs but was influenced by the newer Western ideas. As a concession to these ideas, the bridegroom had known the bride socially for a long time.

The bride wore a beautiful silk costume consisting of a bright-red skirt and green blouse, with bands of yellow and red on the big flowing sleeves. Her face was heavily masked with a thick white powder. Her shiny hair was topped by a multicolored beaded crown. Long, flowing, jewel-studded ribbons hung down her back. The blank expression on her face never changed throughout the elaborate ceremony.

Instead of the fancy Korean costume which is usual for the man, the bridegroom wore a new American-made uniform.

After the rites the bride disappeared with

the female members of the family, and I never saw her again. We followed the bridegroom to his quarters, where we joined in a banquet for men only.

In keeping with old custom, which varies now and then, the bridegroom stays with his bride for three days in his father-in-law's house before returning with her to his own parents' house.

Real manhood begins only after marriage. Even if he is 70, a bachelor's opinion has little influence! Because of the belief in Confucianism and spirit worship, the Korean's aim in life is to have as many children as possible, especially boys, so that the family will continue and his descendants will worship his spirit.

This practice, however, can cause hardships. A well-educated friend of mine in Seoul had been compelled by his family to marry at 19, since he was an only son. At 22, besides a wife and two children to support, his family included a mother, grandfather, grandmother, and great-uncle—none of whom was a breadwinner.

My friend was a Government employee, and his upbringing prevented him from doing manual work, which would have brought better wages. The family had made ends meet only by selling heirlooms and by extra money or food the husband got as interpreter and middleman for the GI's. He looked grimly into the future, and his outlook on life was that of an old man.

Communists Short-circuit Power Line

During my sojourn in Korea there were, paradoxically, few Communist disturbances near the border between North and South Korea. But Communist agents and troublemakers were busy on the island of Cheju and in the southern Province of Cholla.

While I was at the Hwasun coal mine near Kwangju one afternoon, the American adviser told me that Communist trouble was expected that night.

After sundown his Japanese-built house was crowded with the Korean manager's and assistant manager's families, who felt safer in an American billet because, from what I heard, the Communist policy at the time avoided as far as possible harming American citizens.

Suddenly the lights went out. Communists had thrown a chain across the high-tension power line. We passed part of the night on watch with our carbines handy.

I was given the task of watching the side of a hill close to the house. It was late June and I could see faint lights on the hillside. One excitable member of our group was certain that they were glowing cigarettes smoked by Communists while waiting for a general attack.

But the lights were only fireflies! Reassured of this, everybody felt much better, and I went to sleep. Throughout the night there was some shooting in the vicinity between Communists and Korean police.

August 15 Korean Independence Day

By the beginning of July, 1948, the duties and activities of the U. S. Military Government were gradually being transferred to the Korean administration. Formal proclamation of Korean independence was set for August 15.

Throughout the week prior to that promised day, Seoul became busier than usual. Crews feverishly repaired the pavements of the main avenues; others were building colorful arches of triumph with big signs in both Korean and English, "Long Live the Republic of Korea," and "Welcome General MacArthur."

Fortunately, the big day was beautiful and sunny, though very hot. By early morning the capital was in a turmoil, and long lines of school children, youth organizations, and clubs prepared for the parade. Orchestras and bands, both Korean and Western, played gay tunes. Flags and banners decorated every building (page 778).

The main avenue leading to the capitol was lined with constables and impressive mounted police carrying red fanions. A dense crowd representing a cross section of all Korean classes of society jammed into the spacious court of the capitol and lined the avenue leading to it.

By 11 o'clock the platform which had been especially erected for this occasion was filled with the high officials of the new Korean Government, headed by President Syngman Rhee; Lt. Gen. John R. Hodge, the commanding general, and his staff; the United Nations Mission; and accredited consuls. I did not see any Russian uniforms. White jeeps driven by American MP's were constantly patrolling the avenues.

Half an hour later an impressive parade of armored cars, staff cars, and jeeps approached the capitol. General of the Army Douglas MacArthur, accompanied by Mrs. MacArthur, stepped briskly out of a staff car and mounted the podium. Wild applause greeted the speeches of President Rhee, General Hodge, and General MacArthur.

After 1 p.m., General MacArthur left Seoul for the airport and returned to Japan. The rest of the day the Korean crowd paraded the streets. Artistic and often humorous floats

Women Reel Shimmering Threads from the Silken Chambers of Insects

Korea, like China, has raised silkworms for centuries. Japanese learned the sericulture art from Koreans. During the Japanese occupation the Korean industry was stimulated to maintain Japan's dominance in the world silk market.

Much of Korea's silk is the product of home industry, though some power-driven filatures have been built for reeling silk.

Growing silkworms feed on fresh mulberry leaves. Some Korean mulberry trees grow wild, but most are hand-planted. Groves cover hillsides unsuitable to rice cultivation.

Voracious eaters, silkworm larvae mature in about six weeks. They develop two glands containing a clear, viscous fluid. This material, when ejected through orifices on the worm's lower lip, dries into a continuous twin filament immediately upon exposure. In such fashion the larva spins its cocoon upon entering the pupal stage of its transformation into an adult moth.

Silkworms shrink rapidly as they spin the filaments about their bodies. Completed cocoons, such as those seen in the basket, are about one and one-half inches long, whereas the larvae may measure three inches.

The raw cocoon is exposed to steam or hot air to destroy the living pupa. After drying it is scalded to permit unreeling.

A single cocoon may yield 400 to 1,000 yards of filament. Single strands are so delicate that customarily several cocoons are unwound together.

Some 2,000 to 3,000 cocoons are required to produce a pound of silk.

The number of silk crops produced in a year depends upon climate. In some countries production is almost continuous. Korea grows three crops—in spring, summer, and autumn. The earliest of these gives the best yield.

Many of Korea's gaily colored festival costumes, wedding clothes, and women's blouses are silk. Everyday dress is cotton. White, traditionally the color of mourning, predominates.

Numerous ancient customs survive in this Land of Morning Calm. Many are the outgrowth of the people's belief in animism, Buddhism, and Confucianism.

Farm Children Dress in Silks and Smiles for a Festival

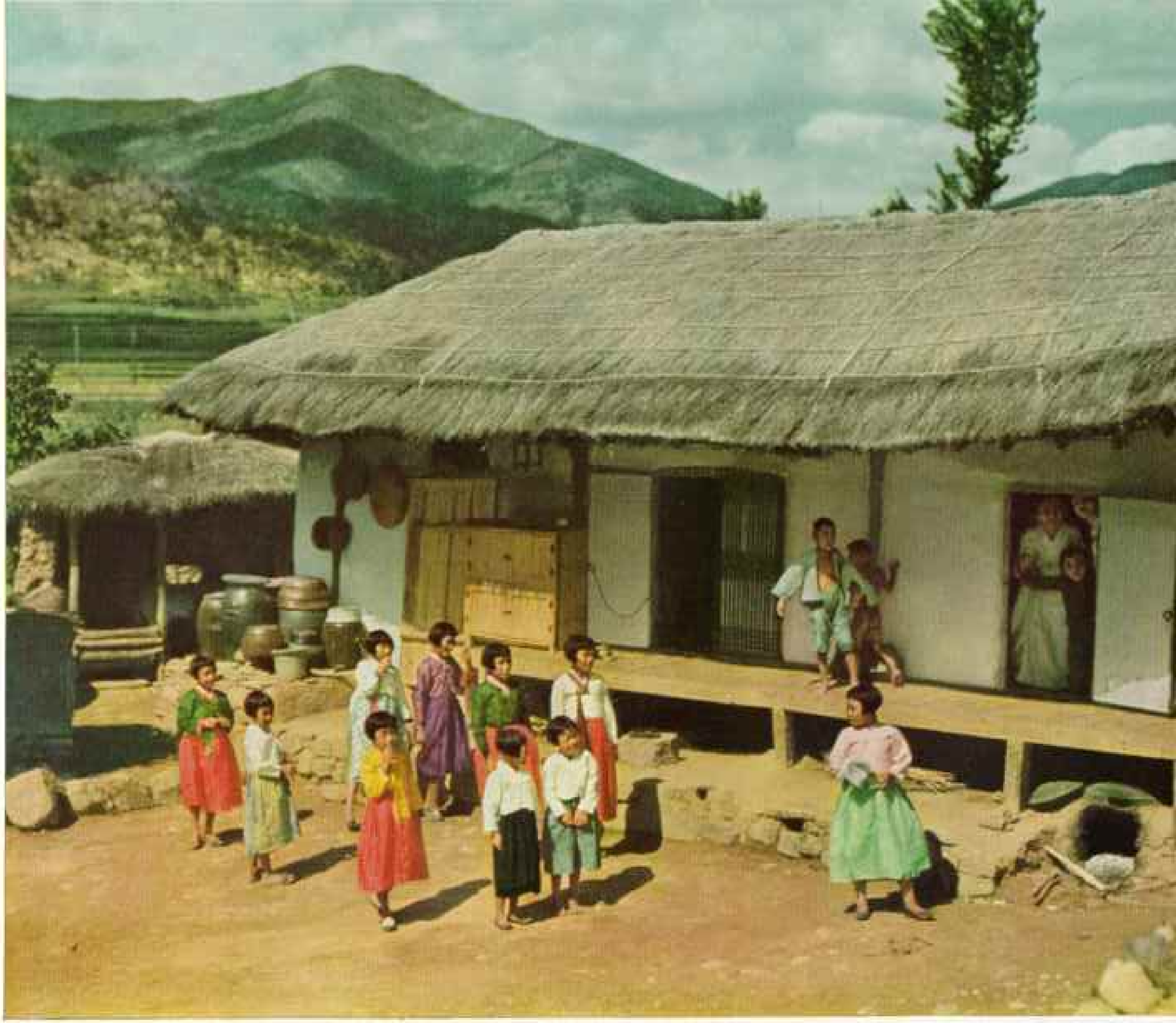
Like most homes in rural Korea, this house is roofed with thick thatch carefully bound down to resist destruction by the wind. Mud-covered walls are whitewashed; doors are covered with paper.

This view shows the summer section. Its floor is raised a foot above ground to afford ventilation.

The winter section has flues in earthen floors through which air from a primitive furnace circulates beneath the rooms—a mode of heating now being explored by some Western architects.

Grain and soybean sauce are stored in the large earthenware jars (left). The blackened pit (lower right) is the mouth of an earthen oven.

These children, seen near Taegu, celebrate birthdays, pilgrimage days, kite-flying competitions, and the New Year, depending on the season. Two boys on the narrow porch hurry to dress up and join girls in the courtyard.



Like Drying Laundry, Korean Tobacco Cures on Rope Lines

Tobacco is a Korean Government monopoly.

Although production was increased under the Japanese regime, Koreans had less tobacco for their own enjoyment, for Japan exported a large quantity to bolster her own economy.

Since the war, Korea has produced 8,900 to 13,700 metric tons a year.

Everywhere the traveler sees older Koreans smoking long-stemmed pipes with bowls so tiny that they hold tobacco enough for only a few puffs. Young moderns prefer cigarettes.

This grass-thatched roof supports sprawling gourd vines and drying red peppers. The latter will spice the family *kimchi* (page 788).

Walls of bamboo and wattle are smeared with mud.

Kodachrome by Bruce Bristol

Man and Ox Ankle-deep in a Puree of Mud Harrow a Rice Field. Spring Planting Gets Under Way North of Seoul

Stooped figures in the distance pull seedlings from a green bed; other workers transplant them at left. Every bit of work is done by hand.

Soggy Pulp of Used Newspapers Is Washed in Streams, Rolled into Sheets, and Dried Against Walls for New Editions

South Korea has an acute shortage of paper owing to the lack of wood pulp and power. These commodities normally come from industrial North Korea in exchange for food. Political differences have shut off virtually all trade between the South and the Communist-dominated North.

Kodachromes by Ray Gilman

Kodachrome by Bruce Brimhall

The Han, Though Less than 250 Miles Long, Becomes a Lordly River as It Sweeps Past Flatlands near Seoul

Small craft and flat-bottomed junks sail nearly two-thirds the river's length. Here raftsmen guide a log shipment downstream from the mountains.

Heavy Rains on Denuded Mountains Often Turn Korean Rivers into Bridge-shattering Torrents

These men, rebuilding a frail structure near Chungju, bind timbers with ropes. They will pave the trestle with twigs and earth.

Kodachromes by Rae Gilman

Babies Ride the Rumble Seat When Mothers Shop for Groceries in Seoul

School-age girls wear long full skirts and short jackets fashioned in the same style as their mothers'. Small boys, off to school, carry books and pencils in knapsacks on their backs.

and big paper dragons were mounted on trucks and horse-drawn carts. Every Korean face shone with pride and happiness. Korea had again become a sovereign nation.

In the afternoon President Rhee held a reception at the former residence of the Japanese governor general, which had also been used as living quarters by General Hodge. White-robed Dr. Rhee, and Mrs. Rhee, a charming Viennese woman in Korean dress, graciously greeted the long line of Korean officials and Americans.

Flood Damages a Lignite Mine

At the end of August I was sent to Kyongsang Pukto and Kyongsang Namdo, two large Provinces in the southeast, with instructions to investigate the bottleneck at the lignite mines there. Gasoline and power shortages had substantially reduced their output.

On this trip I visited the town of Kyongju, capital of the old kingdom of Silla. This kingdom reached a high civilization in the early Christian era. Many ruins of this civilization are found in and about the town. I was especially impressed by the huge mound tombs for kings and princes, now covered with twisted pines.

The temple of Sukka Yurai is simple, with pure lines and arches made of huge blocks of granite set without mortar. There is also a large subterranean room roofed with a cupola made of granite blocks. This room was formerly used for the storage of ice. Near these monuments stand the well-preserved remains of a tower which was used as an observatory.

Rain had been falling constantly for two days when we arrived in the evening at the Yongil lignite mine in a flat valley five miles from the Sea of Japan. All night rain beat a deafening tattoo on the tin roof.

The next morning I looked out the paper window and saw that the near-by stream was almost flush with its protecting dike. Tree trunks, roots, and sometimes cows and hogs were floating by.

Realizing the flood danger, I asked the mine manager if it would not be wise to move my things. He seemed a little annoyed at my anxiety and suggested that we first have breakfast. However, I persuaded him to have my sleeping bag and suitcase put in my truck.

Later we went to the assistant manager's house for a substantial Korean breakfast. In the middle of the meal scared women, children, and dogs came scurrying through the dining room. The dike had broken and flooded the kitchen.

The men rushed out to patch up the broken dike with sandbags. Unsuccessful in this attempt, we waded waist-deep through the strong current to high ground.

We got in our cars and drove to the near-by port of Kuryongpori. Only a few minutes after we crossed a bridge over the irrigation canal it was swept away. At the mine nobody was drowned, but extensive damage was done to the mine itself, with considerable loss of personal property. In the upper valley, unfortunately, four people were drowned.

At the port of Kuryongpori we saw fishermen pulling their craft out of the water to high ground. A typhoon was coming from the south, but by the time it struck Kuryongpori it had lost most of its strength. A few roofs were blown off; there was little other damage.

I found myself blocked for four days in this attractive corner of South Korea until the flood subsided. There was no decent inn in the place, but through Mr. Kim, the mine manager, I was invited to the home of a dried-fish trader and agent for the salt monopoly.

Fishing is an important industry here. Sardines, herring, tunas, flounders, cod, shrimps, crabs, anchovies, abalones, and huge mussels are a few of the many fish and sea foods that abound along this coast. The meat of the abalone makes fine eating, and the beautiful shells are used by the Koreans in inlaid lacquer work.

Eager Buyers Snap Up Whales

Whaling is also important. Koreans are fond of whale meat, which looks like beef.

A few months before, I had seen a 25-foot whale caught near the port of Pohang. Twenty minutes after it was pulled in to the dock the whale was practically gone. Buyers were snapping at the chance of having fresh meat at an advantageous price.

During my four days in Kuryongpori I examined some interesting outcrops of lignite, did some oil painting, and went swimming with my Korean friends. We took food, drinks, and watermelons to the splendid beaches.

On the fifth day scouts sent on foot by Mr. Kim brought word that the rivers and creeks again were low enough, but bridges and sections of the road were washed out.

Fortunately, our Army three-quarter-ton truck with a winch in front was an ideal vehicle for use on such unpredictable roads. It took us seven hours to make the 15 miles from Kuryongpori to Pohang. Often we had to follow the river bed to avoid huge boulders and soft sandy spots.

Using front-wheel drive and the winch, we managed to get out of the river bed onto the undamaged sections of the road. It was a real relief finally to get back to the provincial

U. S. Army Official

Budding Artists Draw American Scenes as Young Koreans Study the U. S. A.

American magazines, teacher-explained, are the chief texts on the subject. Murals show the National Capitol, Manhattan skyscrapers, and, possibly, the Tree that Grows in Brooklyn. The students are fifth-graders in an experimental teacher-training school in Seoul.

highway. A few bridges had been washed out, but traffic had already been resumed.

One Sunday I was invited by a Korean friend living in Ulsan to go on a picnic. Koreans love to spend the day in a cool wooded spot, eating and drinking.

We arrived by truck at the foot of the mountain in the early afternoon and climbed through a beautiful wooded section to a Buddhist temple. The path was lined with piles of small stones placed by pilgrims to appease malevolent spirits of woods and mountain.

Kisang Girls Sing at a Picnic

After half an hour of steep walking, we arrived at a quaint old Buddhist shrine attended by a monk and half a dozen acolytes. On the veranda of a small pavilion at the side of the shrine, the wife of my host with her maids was already preparing food which they had brought up an hour before. Also four kisang girls from Ulsan were there waiting.

The party consisted of seven men. First came the Korean meal and usual routine of toasts. Later the kisang entertainers sang melodious old Korean folk songs, accompanying themselves on the typical Korean gongs and hourglass-shaped drums.

Koreans are musical people, and their music, although influenced by the Chinese, is not so harsh as that of the Chinese or Japanese. Community singing is popular. Every American who has been in Korea knows the *Arirang*, a sad, melodious, romantic love song.

Korean orchestras play not only their native tunes but many Western airs. In the latter they have an excellent sense of the melody, but not of the rhythm.

The Korean folk dances are highly symbolic and not always easy for a Westerner to follow (pages 781, 787).

We left before midnight, walking back down the trail lighted by a faint moon, singing and listening to crickets and night birds.

J. L. Kauffmann

Necks Crane as Seoul, in Holiday Mood, Chooses a Harvest Festival "Swing Queen"

The swinger, starting from a standstill, "pumps" frantically to reach the rope stretched high between poles in the background. For greater safety her feet are strapped to the swing. Flag-decked supports tower 60 feet. Swinging is almost a national sport with Korean women; men seldom participate.

ECA

Belching Smoke, Yongwol Feeds Power-hungry South Korea

Until the Soviets cut it off in May, 1948, two-thirds of the South's electricity came from big Jap-built hydro installations in North Korea. Now Yongwol is the South's largest power source (page 795). ECA plans vital new hydro and steam plants. Some 45 percent of Korea's low-grade coal is ash; it goes up the chimney in smoke. New equipment at the mines will remove the ash, improve the coal.

When the time came for me to leave the country, I found out how precious a prize is an American automobile.

A month after my arrival I bought a car from a colonel who was returning to the States. For his 1939 Hudson I paid $680.

As soon as it became known that I was leaving, Koreans in Seoul clamored to buy my car. They offered from $1,200 to $2,500.

I told them that according to Army regulations my car could be sold only through the Provost Marshal to Americans and at a price not higher than I had paid.

To a man who was particularly insistent, I added that I could not make out a bill of sale if I sold the car to him and that he could be thrown into jail if the police found it in his possession.

"Don't worry," he answered. "The day before you leave Korea, you declare that your car has been stolen. By that time it will be over the 38th parallel, and no one on this side will see it again."

Naturally I declined, and I got my money back by selling the car to an American friend. Later I was told that it could bring the equivalent of $5,000 in the Russian Zone.

During the months I spent in South Korea, hundreds of cars, jeeps, and trucks were stolen. Many, however, were recovered by American MP's or Korean police. An automobile not carefully watched was the prey of organized bands of thieves who stripped it of headlights, tires, and all movable equipment if unable to drive it away.

All in all, there never was a dull moment in this "Land of Morning Calm." *

* See "Chosen—Land of Morning Calm," by Mabel Craft Deering, National Geographic Magazine, October, 1933. For additional articles on Korea, see "National Geographic Magazine Cumulative Index, 1899–1949."

Lightning in Action

By F. Barrows Colton

LIGHTNING, with its terrible destructive power, has been rightfully feared by man for countless ages. For most of that time he was helpless against this terrifying attack by Nature's forces.

But today this age-old enemy is being at least partially tamed.

Lightning is as dangerous and unpredictable as ever, but much of the death and damage it used to cause is now prevented by knowledge of its behavior.

This "taming" of lightning has come about through better understanding of what lightning really is and how it works.

The old Greeks thought that lightning strokes were flaming spears that their god Zeus hurled down at his enemies from the clouds above. Most of us still think of lightning as "striking" down at a man or building from the sky.

But one of the new things that has been learned about lightning is that it may actually "strike" upward from the ground. This is because lightning is really a high-speed flow of current back and forth between powerful electric charges that have accumulated not only in the thundercloud but in the ground below it.

It is the current flowing up out of the ground that probably does the damage; in other words, that "strikes" (pages 812-813).

Knowing this fact has not enabled us to control lightning, but it has aided in showing how to avoid lightning's dangers.

Bolts Play Strange Tricks

Lightning plays strange tricks. Once it struck and set fire to a house, then leaped to a near-by fire-alarm box, set it off, and summoned the engines!

A New Jersey farmer sat reading under a lamp in his home. Lightning flashed along the wiring and singed off his hair to within a quarter of an inch of his scalp, but did him no other harm.

Two boys were struck while they slept in a tent beside a lake in Maine. They awoke to find their legs paralyzed from the waist down, their feet, legs, and sides burned, and an ax blade between them melted. Eventually the paralysis in their legs passed away.

In Minneapolis lightning threw a typewriter up from a table and imbedded it in the ceiling. A closet door was torn off and hurled to the porch roof outside. A dresser was shattered, but one drawer remained undamaged and was driven between the springs and mattress of a bed in which two girls were sleeping.

All these and innumerable other antics of lightning can be explained if you remember that lightning is an electric current.* At the end of the stroke it always tries to find a path of least resistance. That's why it follows wires, jumps to metal objects, and sometimes goes through people's bodies because they offer less resistance than air, which is not a good conductor.

Odd Facts About Lightning

Here are some other facts about lightning:

Your chance of being killed by lightning in the United States is about one in 365,000.

Lightning can and does strike not only twice but many times in the same place. It has hit the Empire State Building in New York City as many as 12 times in 20 minutes, and as often as 50 times a year (pages 823 and 827).

One of the safest places you can be during a lightning storm is in your car, if it's an all-steel closed model, as are most modern ones. If the car is struck, the steel body will conduct the current away from you (page 821). Equally safe, but less practical, are the insides of your furnace and mechanical refrigerator, for they're all metal too!

Lightning rods don't keep lightning from striking your house or barn. But if lightning does strike a properly rodded building, the rod system carries the current harmlessly to the ground, without fire or other damage.

If lightning strikes an all-metal airplane, such as those in general use on commercial airlines today, the people inside will not be harmed. There is no known case of lightning directly causing an airplane accident (pages 818, 819).

Lightning strokes between two clouds actually are far more frequent than between a cloud and the ground. In such a case one cloud carries a negative charge, the other a positive one. Lightning also can occur inside a single cloud, between the negative charge in one part of the cloud and a positive charge in another.

Power enough to supply a large city, hundreds of thousands of amperes, may be contained in a single lightning stroke. The most powerful stroke ever recorded in the United States hit the Cathedral of Learning of the University of Pittsburgh on July 31, 1947. It discharged a current of 345,000 amperes, or

* See "The Fire of Heaven (Electricity)," by Albert W. Atwood, National Geographic Magazine, November, 1948.

Acme

Mains Broke, Gas Burned, and a Car Fell into the Subway When a Bolt Struck in Brooklyn

Gas lines under the street were supported by temporary decking. When lightning smashed the props, pipes collapsed and gas caught fire. Gas in tanks or subsurface mains cannot be exploded by lightning.

enough to light more than 600,000 sixty-watt bulbs for the duration of the flash. This vast power, however, is "turned on" for only about 35 millionths of a second.

Lightning strokes between a cloud and the ground may be three miles long or more. Between two clouds they may flash over a distance up to 10 miles. Lightning travels 20,000 miles a second.

Franklin and His Famous Kite

Ben Franklin, when he flew his famous kite in a thunderstorm in 1752, probably didn't draw actual lightning down his kite string to the key at the lower end. If he had, he might not have lived to tell the tale (page 824).

The electric sparks that jumped off the key were most probably produced not by lightning itself but by the discharge of stored-up electricity in the air, a condition that goes with a lightning storm. That detracts in no way from Franklin's fame as the discoverer that lightning is electricity and that a system of lightning rods will protect buildings from damage.

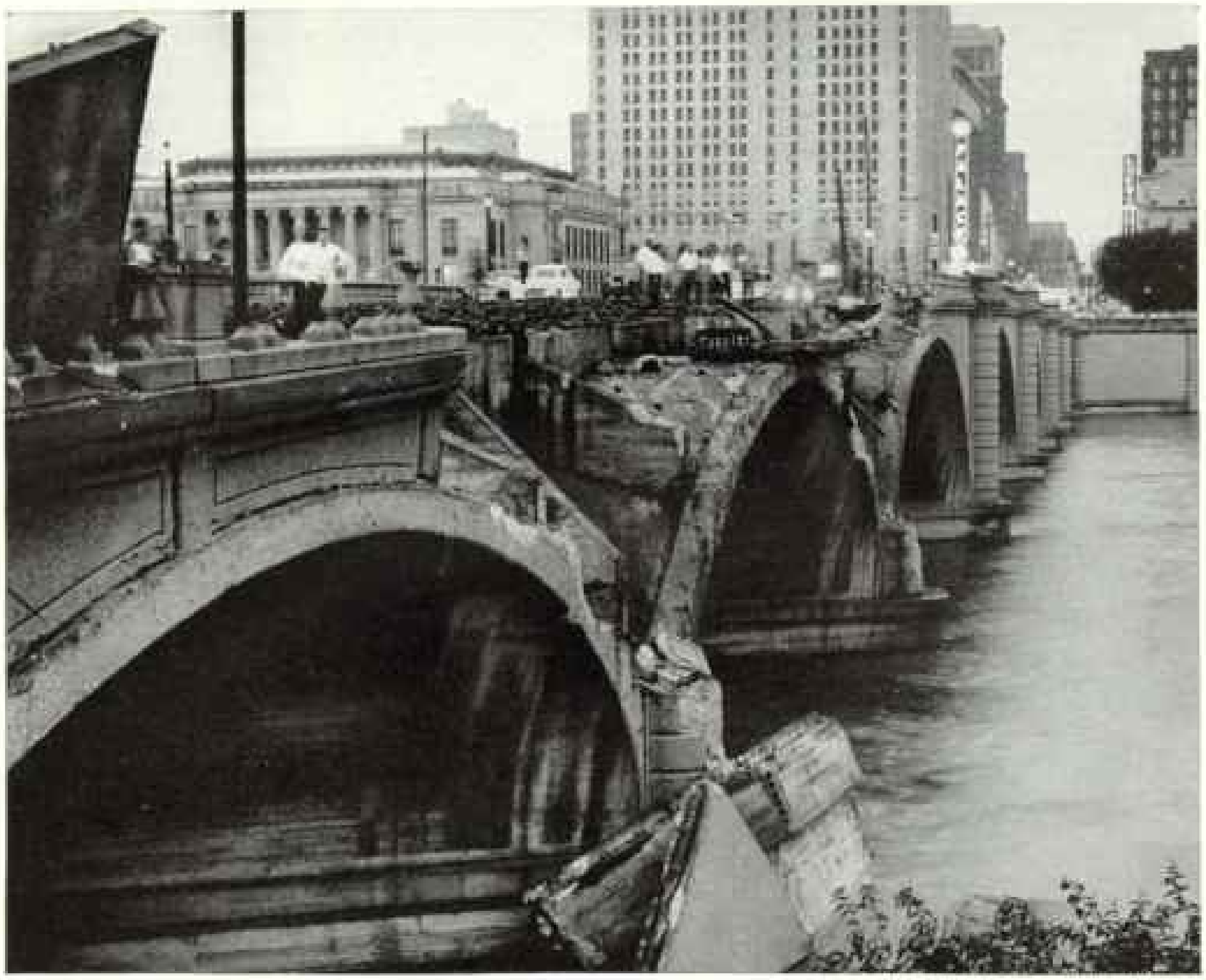
Lightning is very hot. Some strokes at their peaks generate a temperature as high at 27,000° F.

You've probably tried estimating how far away a lightning flash is by counting the seconds between the flash and the noise of the thunder.

Light from the flash reaches your eye almost instantaneously, but the sound of thunder travels only about 1,100 feet a second. If you count five seconds between flash and thunder, the lightning was about 5,500 feet, or one mile, distant.

My grandmother used to say that thunder came from clouds bumping together. Today the scientists know that it really is the noise produced when the lightning current literally explodes apart the atoms and molecules of the air as it smashes through them.

Those ripping, tearing sounds so often heard when a storm is at its height come from the



W. J. Trapp from Columbus Dispatch

A Heavy Bomb Could Scarcely Do More Harm than the Bolt Which Struck Here

Lightning is believed to have penetrated this Columbus, Ohio, bridge and caused an explosion, resulting in the damage. One person was killed; four were hurled into the river.

lightning striking the ground near by. The rumbling, booming kind of thunder comes from strokes to the ground at a distance.

Thunder cannot be heard more than about 18 miles. Sounds of cannon fire carry much farther. Some lightning strokes produce no thunder. They are "slow," lasting 1/10 to 1/20 of a second instead of the usual few millionths. They do not break down the air atoms fast enough to make an explosive noise.

Some people who are struck by lightning die needlessly because others near by are afraid to touch them, believing that their bodies are charged with electricity.

Actually, the lightning current passes instantaneously out of the body of the victim into the ground. If he is not instantly killed, he may be saved by the prompt use of artificial respiration.

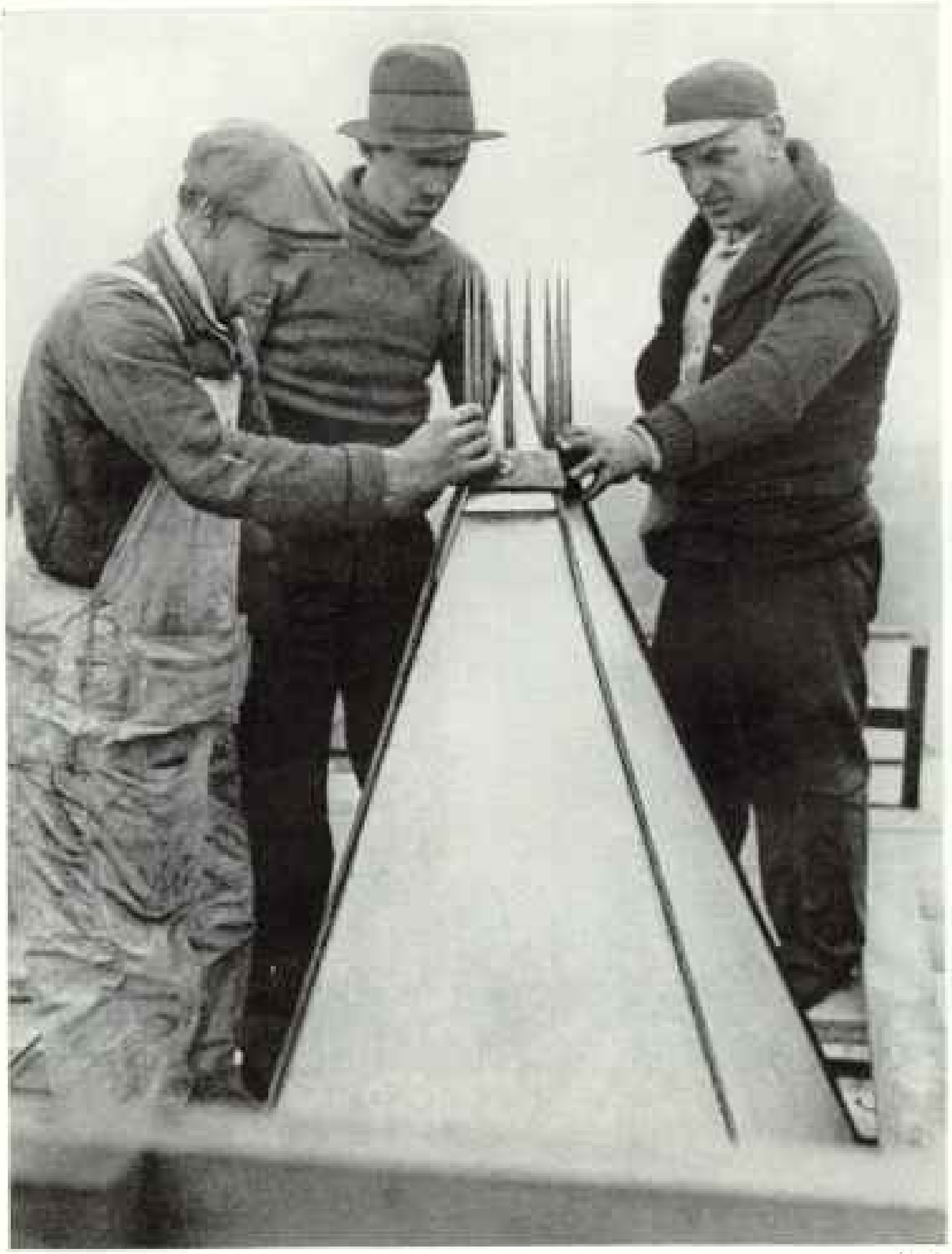
High-voltage electric current passing through the body often paralyzes the nerves and muscles controlling the diaphragm, or breathing mechanism. Artificial respiration keeps the victim breathing until this paralysis passes away. Lightning victims also are usually burned, but the burns can be cared for later. First of all, try artificial respiration.

Fertilizer from the Air

Lightning does some good, too. It manufactures, right out of the air, about 100 million tons of valuable nitrogen fertilizer every year. Air consists of roughly four parts nitrogen to one part oxygen. Lightning discharges combine the nitrogen and oxygen with the rain which carries the fixed nitrogen down. Much of it falls into the sea, but enough comes down on land to help at least a little in fertilizing the soil.

Fertilizer manufacturers have used the same method to get nitrogen out of the air, by discharging electric sparks continuously, a far more efficient method than Nature's haphazard way.

Over the earth as a whole, it is estimated



Acme

Eight Lightning Rods Guard Washington Monument's Tip

Though the Monument has been struck as many as six times in a single storm, the current flows harmlessly to earth along the rod system connected with the steel elevator shaft. As a precaution, the elevator is stopped during electrical storms. These men examine noncorroding platinum points from a scaffold a few feet short of the tower's 555-foot peak.

that there are some 44,000 lightning storms every day, 100 lightning flashes every second. In the United States alone about 400 people are killed annually by lightning, and around 1,500 more injured.*

Insurance companies in the United States between 1936 and 1946 paid $54,148,995 in claims for fires caused by lightning. Nobody knows how much more was lost in unreported and uninsured fires. Lightning stands fourth among the causes of fire-loss claims.

Lightning is the leading cause of fires on farms and in rural areas, and most of the deaths and injuries from lightning occur in the country. That is because the crowded buildings of large cities offer better protection from lightning strikes. They usually also contain water and heating pipes that act like lightning rods to carry current to the ground if a house is struck, resulting in less damage. In cities, too, there's better fire protection.

How Nature Produces Lightning

Just how Nature produces a stroke of lightning is now pretty well understood by scientists, though some of the details are still uncertain. It is a gigantic and awe-inspiring process (pages 816, 820).

A thundercloud takes shape when rising air currents carry moisture far aloft. Raindrops form in the cloud and start to fall. Inside the cloud, turbulent air currents are moving up and down at terrific speed. These currents toss the raindrops about, breaking them up, and somehow in this process a negative electric charge is concentrated in the lower part of the cloud. All this Julius H. Hagenguth of the General Electric Company's High Voltage Engineering Laboratory explained to me.

This charge grows stronger and stronger as the up and down drafts inside the cloud keep ripping and tearing at the raindrops. The negative charge in the cloud attracts to the ground area beneath it an exactly equal positive charge. As the wind blows the thundercloud along, the charge in the ground follows directly below.

Positive and negative electric charges always attract each other. The charges in the

* See "Weather Fights and Works for Man," by F. Barrows Colton, National Geographic Magazine, December, 1943.

ground and cloud try desperately to come together, but the air between them prevents this at first, because air is not a good conductor of electricity. As the charge in the earth moves along, it swarms up trees, buildings, chimneys, and steeples in its path in an effort to reach the cloud.

Soon the charge in the cloud begins to send down a short spurt or "leader" stroke toward the ground. This shoots down about 80 feet below the cloud, breaking apart, or "ionizing," the atoms of air in its path. When air atoms are broken apart this way, they suddenly become better conductors of electricity.

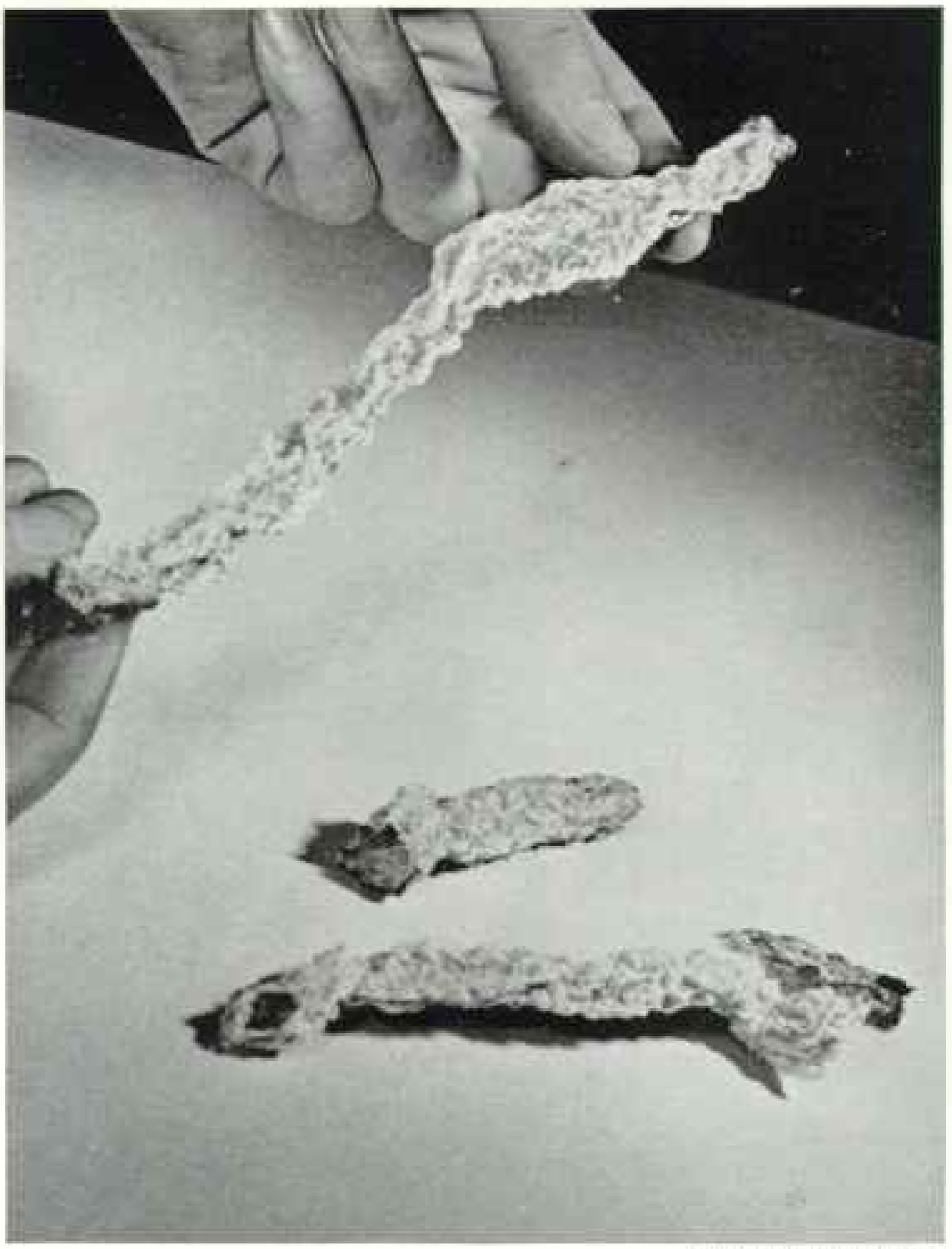
Following the path thus made, the leader flashes downward by steps. Meanwhile, the positive electric charge in the ground is being attracted and concentrated by the downward-flashing leader. Finally, when the leader almost reaches the ground, the ground charge may send up a leader of its own, a single or multiple streamer, to connect with the leader coming from the cloud. All this happens in a hundredth of a second, more or less.

Suddenly the leaders from the cloud and ground push down and up far enough to meet. An unbroken pathway of ionized air now extends from cloud to ground. Then, along this path, a terrific flow of current rushes, from ground to cloud. This is the lightning flash you see, and it is probably what does the damage.

This stroke follows a path of ionized air that may be as thin as a hair or about two inches wide. After the main stroke, several other minor ones may rush up and down this path between cloud and ground, but so fast that to the eye they all appear as part of the one big flash.

Lightning's desperate eagerness to flow between cloud and ground explains most of the seemingly freak things that it sometimes does. It is more likely to strike tall objects, such as trees, barns, or steeples, because they furnish a shorter path between cloud and ground.

Lightning smashes brick chimneys, furniture, wooden walls, and plaster because such materials offer resistance to its progress. In forcing its way through them, it builds up internal pressures that expand outward with explosive force. Trees ripped apart by lightning are literally blasted by gases formed within the wood by the lightning's passage.



Westinghouse Electric Corp.

Lightning's Passage Fuses Sand into Hollow Tubes

Known as fulgurites, these samples were made by artificial lightning shot through quartz sand in the Westinghouse High Voltage Laboratory. Fulgurites sometimes are made when lightning surges through dry sand in search of moist earth. Sudden, extreme heat expands gases, fusing the sand.

National Geographic Photographer John E. Fletcher

Lightning Rods Guard 23 Mount Vernon Trees, Including 10 Planted by Washington

Unprotected trees are hazardous refuges in storms; they may be ripped apart when a bolt's passage forms expanding gases within the wood. Anyone caught in the open might better lie on the ground (opposite page). Here a cable is installed on a 75-year-old pecan to connect rods in the foliage with others buried in the Virginia soil.

Lightning rods of today are not the tall spindles ornamented with glass balls that you sometimes still see on farm buildings. They are short metal spikes, all connected to copper or galvanized-iron cables that lead down the sides of the building and go into the ground deep enough to contact soil that is permanently moist.

If lightning rods are placed on a building that contains other metal, such as a forage or hay-loader trolley in a barn, electric-light wires, plumbing, etc., all these are bonded to the rod system.

Any steel-frame structure, such as a skyscraper, is a lightning rod in itself. A lightning bolt striking it is automatically carried harmlessly to the ground by the steel. There should be a metal connection between the outside of the roof and the frame, however, so that lightning will not damage the roof in making its way inside to reach the steel.

Rods Protect Even Trees and Monuments

Lightning rods are used to protect historic and valuable trees, and many important monuments are equipped with them, including the Statue of Liberty in New York Harbor and the Washington Monument (pages 812 and opposite).

During World War II ammunition factories were specially guarded against lightning. Local Weather Bureau offices kept them informed of the approach of thunderstorms. Patrol cars also often scoured the countryside equipped with radio to warn of storms.

When a storm came close, operations ceased until the danger was past. Even if lightning did not strike the factory, there was danger from the static electricity existing in the atmosphere, which always accompanies a thunderstorm.

"St. Elmo's fire," which sailors used to think was a portent of disaster when they saw its eerie glow on the tips of masts or spars, actually is a warning that conditions are ripe for a lightning stroke.

It shows that electrical charges have built up in the clouds overhead and the ground below, and that the charge in the ground is so strong that some of it is "leaking" off in visible form. The charge flows off most easily from a high, sharp point such as a steeple, mast, or flagpole, but it may appear almost anywhere.

Two boys riding horseback suddenly noticed that each other's heads and the rumps of their horses were outlined by the glow of St. Elmo's fire.

Though harmless, St. Elmo's fire has been regarded with superstitious awe by sailors, as in Coleridge's *Rime of the Ancient Mariner:*

> About, about, in reel and rout
> The death-fires danced at night . . .

Others have believed it to be a weather indicator. Longfellow's *Golden Legend* says:

> Last night I saw Saint Elmo's stars,
> With their glimmering lanterns, all at play
> On the tops of the masts and the tips of the spars,
> And I knew we should have foul weather today.

Since a lightning storm is certainly "foul weather," the old belief was not so far wrong!

St. Elmo's fire sometimes is seen on the wing tips and propellers of airplanes, where it is a sign of a special kind of trouble. It means that an electrical charge has built up on the airplane and in flowing off is causing such severe radio static that the pilot cannot communicate with the ground or other planes. Today this is largely overcome by metallized cotton cords that conduct the discharges off into space without causing static.

A Few Rules of Safety

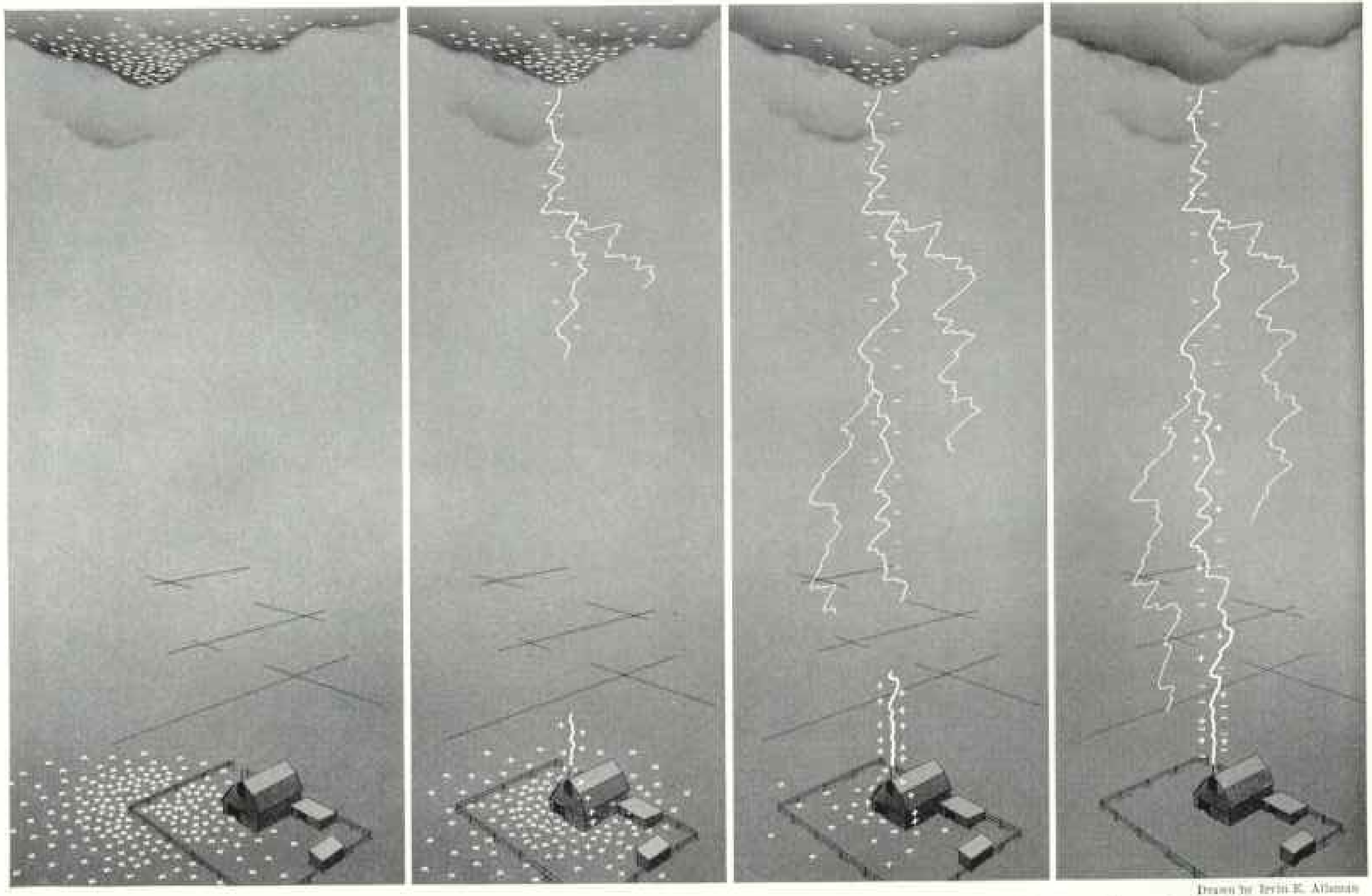
Much of the death and injury from lightning could be avoided if people kept in mind a few rules of safety.

Most important: get indoors, in a house, barn, or whatever building is handy, the bigger the better. Roofs and walls of buildings usually provide an easier path than the human body for lightning to follow to the ground.

When a thunderstorm threatens, keep away from beaches, fields, golf courses, and other open places. Don't go in swimming, for you may be electrocuted by lightning current that has traveled through the water from some distance away. Even if it only stuns you, you may drown. Don't ride a bicycle or horse, or operate an open machine such as a tractor.

Keep away from exposed hilltops, high masts, and isolated tall trees. A tree or similar object is a triple threat. If the tree is struck, the lightning may jump from it to your body; it may enter your body from the ground after striking the tree; or the tree may explode, injuring you by flying fragments. Don't go near wire fences, or other wires. Lightning may travel long distances along barbed-wire fences, far from the place where it originally struck. Livestock often is killed this way.

Indoors, the center of the room is about the safest place. Closing the windows will not stop lightning from entering. Since the chimney is usually the highest part of a house, lightning may strike there and follow down into the fireplace or stove; therefore, those are good places to avoid. Wiring systems and



Drawn by Irvin E. Allamon

How Lightning Strikes: Electric Charges in Earth and Cloud Make Contact, Sending Heavy Current Through the Barn

In a thunderstorm a negative charge builds up in the cloud and a positive charge in the ground (minus and plus signs). Charges attract each other, sending streamers down from the cloud and up from the highest point on the ground. When they meet, a powerful current flows between. This is lightning (pages 812, 820).

Westinghouse Electric Corp.

Man-made Lightning Striking a Model Power Line in a Laboratory Shows How Overhead Wires Prevent Damage

Westinghouse engineers use this miniature system for tests. Upper wires detour the three-million-volt stroke harmlessly to the ground. Lower wires, which carry the power load, are thereby protected against lightning, which might shut off the current or damage equipment (page 826). Even the cows are man-made.

U. S. Air Force, Official

Though Lightning Strikes Within Inches, Passengers Are Safe in an All-metal Plane

A test at the United States Air Force's All-weather Flying Center, Wilmington, Ohio, shows how the plane's metal skin sheds current. In the air it might suffer holes burned in wing tips or fuselage, or a radio antenna burned away. Two passengers calmly ignore the man-made bolt (pages 809 and opposite).

National Geographic Photographer Willard R. Culver

Lightning Striking a Golf Green's Flagstaff Left Its Imprint on the Grass

Golf courses and other open areas are dangerous during electrical storms (page 815). This weird mark was made on the grounds of the Chevy Chase Club near Washington, D. C.

water pipes also make good pathways for lightning that strikes a house; so avoid the radio and electric-light switches, keep away from radiators, and don't take a bath or shower.

All telephone lines entering buildings are equipped with lightning arresters, which reduce but do not eliminate the danger of using the phone during a lightning storm. It is better to postpone a call until the storm has passed, especially in rural areas.

If you do get caught away from shelter, out in the open, take refuge in a ditch or cave or under an overhanging cliff, rather than stay in an exposed place. If there is no shelter of any kind, it's safer to lie on the ground than to stand up. Getting wet is better than being struck by lightning. Wearing rubbers, incidentally, will not protect you from a lightning strike.

A newspaperman in Ohio who was struck by lightning lived to write about it in his paper. He was standing in a barn door when a bolt knocked him unconscious. When he came to, he first felt that he wanted to die; then this feeling was replaced by a great desire to live. He couldn't move or speak, and felt numb all over. When feeling returned, he suffered severe pain, which persisted for a long time in his bones, muscles, and ligaments. He had burns on his face and body. His sports shirt was torn to shreds and the buttons ripped off.

In a national forest in Utah lightning struck in the midst of a herd of sheep and killed 835. The herder was knocked unconscious for two hours. In this case the sheep probably were killed by the stroke traveling from the ground up one leg, through the body, and down another leg. This was because the ground offered more resistance to the passage of the current than the sheep's bodies.

Cows often are killed the same way.

Little Danger to Airplane Travelers

Lightning is not a serious danger to airplanes, because, if they are struck, the metal skin conducts the current away from the pilots and passengers (opposite page).

Daring pilots participating in the "thunderstorm project" operated by the U. S. Weather Bureau, Navy, and Air Force flew planes 1,363 times into the centers of thunderstorms to see what would happen. The planes were struck by lightning 20 different times, but the only damage was radio antennas burned off, small holes up to dime size drilled in wing tips, rudders, and elevators, and the head of one airspeed indicator slightly bent.

Forked Lightning, the Storm God's Grasping Fingers, Seems to Reach for Prey

Lightning bolts from the sky branch out in this fashion as they grope for currents rising from the ground (pages 812, 816). Strokes from cloud to ground may be three miles long, those from cloud to cloud 10 miles (page 810). This spectacular night display illuminates Milwaukee, Wisconsin.

Westinghouse Electric Corp.

Lightning Cannot Harm the Driver Who Stays Inside His Steel Fort

A three-million-volt stroke strikes harmlessly in this test at Westinghouse's High Voltage Laboratory. Metal carries the current to the front wheel, where it leaps across rubber to ground (page 809).

One pilot flying through a thunderstorm at 26,000 feet in heavy snow reported: "Radio static kept building in intensity until it was so severe that I couldn't keep the earphones close to my ears. I heard what sounded like the sharp burst of a German 88-mm. gun. A sheet of flame simultaneously enveloped the entire cockpit. My airspeed indicator jumped from 190 to 500 miles per hour and stayed there.

"Everything looked a bit fuzzy. The air was so turbulent and the instruments jumped around so much that I couldn't tell for a moment what was going on. I just let the airplane buck through. Then after what seemed hours the airspeed came back to normal."

Film records showed that his airspeed indicator actually stayed at the erroneous reading of 500 miles per hour for only about 30 seconds. The radar operator in the same plane, who was not wearing dark goggles, said he was unable to read his indicator panel for about two minutes after the flash.

Dr. Ross Gunn of the Weather Bureau made 25 flights through thunderstorms, and his plane was struck three times. He heard only sharp clicks when the lightning hit, once within a foot of him. No one felt anything.

Pilots avoid thunderstorms, not because of lightning, but because of the far greater danger from the turbulent air currents inside the cloud. Such currents can dash a plane thousands of feet upward or downward in seconds. They have thrown B-29's on their backs.

To the U. S. forest fire lookouts* who guard

* See "Forest Lookout," by Ella E. Clark, National Geographic Magazine, July, 1946.

822 Hans Groenhoff

A Sailplane Pilot Sets Out to Ride a Turbulent, Drafty Elevator into the Sky

A few glider men venturing into true thunderheads have been driven upward a mile a minute and tossed like feathers. This cumulus congestus cloud promises updrafts but no lightning. The plane, *Screamin' Wiener*, takes a tow near Elmira, New York. In Texas it set an international goal-and-return record of 229 miles.

823 General Electric Company

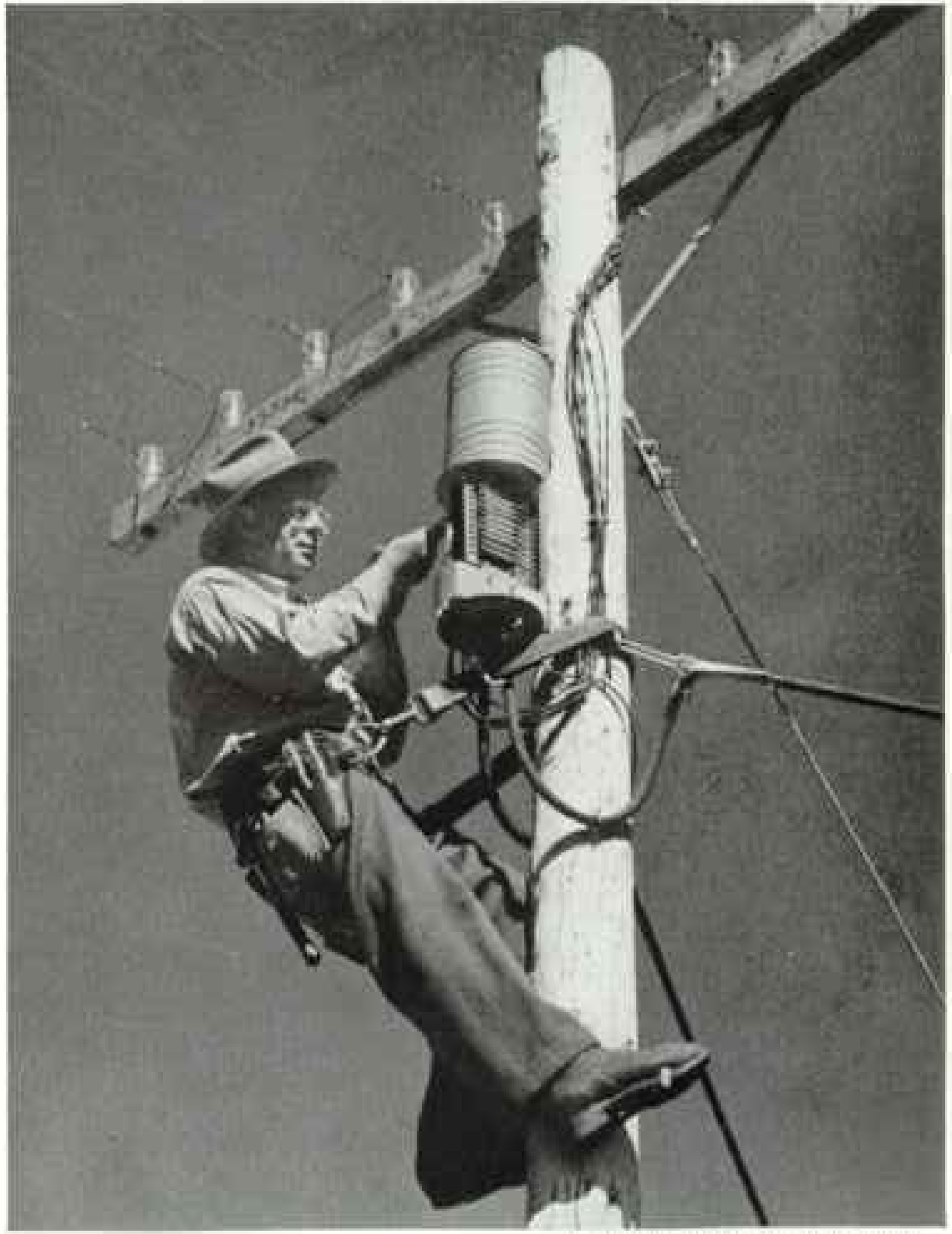
Lightning, Quicker than the Eye, Is Analyzed by the Camera. Eleven Strokes Appear as One

A central lens photographs what the eye sees, a "single" bolt to New York's Empire State Building. A second lens slowly rotating around the other records the 11 (numbered) flashes which actually sped between cloud and tower. Scientists put such seemingly unimportant facts to work protecting electrical equipment (pp. 809, 827).

Bettmann Archive

Ben Franklin's Kite String Was More Dangerous than He Knew

Sparks that jumped off his famous key were only atmospheric electricity, scientists believe. True lightning probably would have killed him. Franklin actually flew his kite from a doorway that kept him dry, together with the end of his kite string. In the open, the risk would have been much greater (p. 819).



W. E. Shawvald from U. S. Forest Service

With a Lightning Protector, These Wires Will Meet Emergencies

Lightning has been known to vaporize hundreds of feet of telephone wire, leaving empty insulation. Bolts start three-fourths of the forest fires in our Northwest. This engineer checks a lightning device in Lolo National Forest, Montana. Without it the line might be knocked out, delaying fire fighters.

Man's Mightiest Bolt Leaps 50 Feet with Thunderous Roar

Most powerful artificial lightning ever created flashes between two generators in the General Electric Company's High Voltage Laboratory at Pittsfield, Massachusetts, with a peak energy of 15 million volts (page 827).

Scientists make lightning on the same principle as Nature. A positive charge is built up in one generator (lower left) and a negative in the other (extreme right). These charges attract each other. When they become strong enough, the current leaps between them.

In the same way, Nature's lightning jumps between negative charge in a storm cloud and positive charge in the earth, but over a wider distance (diagrams, page 816).

Branches forking out from the main stroke show where currents from the two generators try to come together by various routes. A similar phenomenon occurs in natural lightning (page 812).

Man-made lightning is as powerful as the real thing, but the strokes are shorter. Scientists use it to learn how Nature's lightning behaves. They employ this knowledge to protect power lines and equipment (pages 817, 826).

National Geographic Photographer
Robert F. Sisson

the national forests in the inaccessible mountains of the Pacific Northwest, lightning is a dreaded enemy. It starts about 6,000 forest fires in this country every year.

In the East, where rain more often accompanies or follows a storm, lightning causes only about 10 percent of the forest fires. But in the Northwest it starts three-fourths of all the fires, a far greater menace than careless campers (page 824).

In the central Sierra Nevada forests, one year, lightning started 100 fires every day for seven days.

Lookouts Guard Against Forest Fires

All during the summer thunderstorm season, fire lookouts anxiously scan the horizon for thunderheads. When the lightning begins to flash, they try to spot the directions of the places where they can see it strike. These places may need watching for days, for a lightning fire may smolder for a week in the dry duff of the forest floor before giving out a telltale column of smoke.

Fire lookouts in their exposed mountaintop stations sometimes have been struck and killed by lightning, but today the lookout's shack is the safest place on the mountain. The metal roof is bonded to heavy cables that run down the corners and out in deep trenches to a buried wire net or bed of salt. All metal objects, such as the stove and bed, are connected to the cable. The lookout avoids using his telephone while the storm is raging.

On one mountain in Idaho, appropriately named Heavens Gate, blue flames often play around the telephone circuit grounding wire during a lightning storm. Lightning running along forest telephone lines has been known to vaporize hundreds of feet of wire, leaving nothing but empty insulation strung beside the trail.

If the lightning starts a fire, the lookout calls for the air-borne fire fighters, who drop by parachute or land via helicopter close to the fire. Sometimes even then they're baffled, for the fire may be smoldering in a hollow or rotten treetop, invisible to men on the ground under the thick trees.

Lightning can be a menace to the fire fighters too. One man stopped to rest with a foot on the blade of his shovel stuck in the wet ground. Lightning hit a near-by tree, jumped to the shovel, and knocked the man unconscious.

Since scientists can't stop lightning from striking valuable timberlands, they now are planning a new attack, against the source of the lightning. They plan to try dissipating thunderclouds with dry ice before the lightning ever gets started.

U. S. Forest Service officials, at the suggestion of Dr. Vincent J. Schaefer of the General Electric Research Laboratory, plan to drop dry ice from airplanes flying over the tops of upsurging thunderheads.

Dr. Schaefer says it is believed that thunderclouds would not accumulate the electric charges that produce lightning if the water droplets in them were not considerably "supercooled." He thinks that if a large degree of supercooling can be prevented by changing the water droplets to ice crystals, the cloud ceases to be a lightning factory, and lightning will not occur.

This can be brought about, he thinks, by "seeding" the cloud with small quantities of dry ice, the same method that he and Dr. Irving Langmuir discovered to produce snow and rain from clouds that otherwise refused to give up their moisture.

Most of our modern knowledge of lightning comes from research done by the big manufacturers of electrical equipment, such as General Electric and Westinghouse Electric Corporation. Lightning has been one of their big headaches.

Protection for Power Lines

In today's electrical age, the countryside is crisscrossed with electric power transmission lines, favorite targets of lightning strikes. Every mile of transmission line in some parts of the United States is struck by lightning on an average of once a year.

Lightning striking an unprotected transmission line may cause an interruption in the flow of electricity that can deprive a whole city of light and power for hours. A delicate surgical operation, on which a man's life depends, may be interrupted at the crucial moment. Electric refrigerators, clocks, elevators, factory motors, and innumerable other kinds of electrically powered equipment may fail, with potentially disastrous results.

Before lightning protection devices were in general use, some power lines had as many as 100 interruptions to service in a single year.

Lightning can interfere with a city's electric power in two ways. After striking a power line, it may travel along the wires and do serious damage to transformers, generators, motors, and other equipment. Or it may jump from the power line across an insulator to the steel tower and go to the ground. The regular power "juice" may follow the lightning current, leaking off into the ground instead of flowing along the line. The effect is the same as a heavy leak in a water pipe.

To avoid this, lightning arresters are installed. They operate like safety valves on

boilers, which stay closed until dangerous steam pressure builds up. The arresters are connected between the power line and ground. The normal amount of voltage, or electrical pressure, on the line cannot open the "safety valve" to get to the ground.

But if lightning strikes the line, the voltage is vastly increased. This opens the valve, and the lightning current is carried off to the ground without further damage to the line. At the same time, the arrester keeps the regular power current from following the lightning current to the ground.

Many power lines are protected by a special "ground" wire or wires strung along the lines some distance above the wires that carry the power.

These upper wires are grounded—that is, connected to the ground—at frequent intervals, and act as horizontal lightning rods. Lightning is more likely to strike them first, and is carried off to the ground without doing damage (page 817).

Sometimes lightning may jump from the ground line to the power line. Then circuit breakers come into action and disconnect the line from the power source. After a fraction of a second, they are closed again, and power flow resumes. It all happens so fast that there is only a flicker of the lights and no noticeable interruption in the use of power equipment.

"Man-made" Lightning Produced in High Voltage Laboratory

Most of what is known today about lightning has come from experiments both with the real thing and with "man-made" lightning, which can be controlled and made to strike when and where desired.

Lightning strikes so often on the top of the Empire State Building in New York City (pages 809 and 823) that General Electric Company engineers set up instruments there every summer, knowing they can depend on having many strokes to aid their experiments.

High-speed cameras and oscillographs are turned on by the lightning itself and automatically photograph the strokes and record the rise and fall of current during a flash. This research has shown that what appears to be a single stroke actually may be several (page 823).

General Electric's new High Voltage Laboratory at Pittsfield, Massachusetts, uses artificial lightning strokes up to 50 feet long, with a power of 15 million volts, for research.

This man-made lightning is produced in essentially the same way that Nature does it, but two big electrical generators take the place of the thundercloud and ground (page 825).

Acme

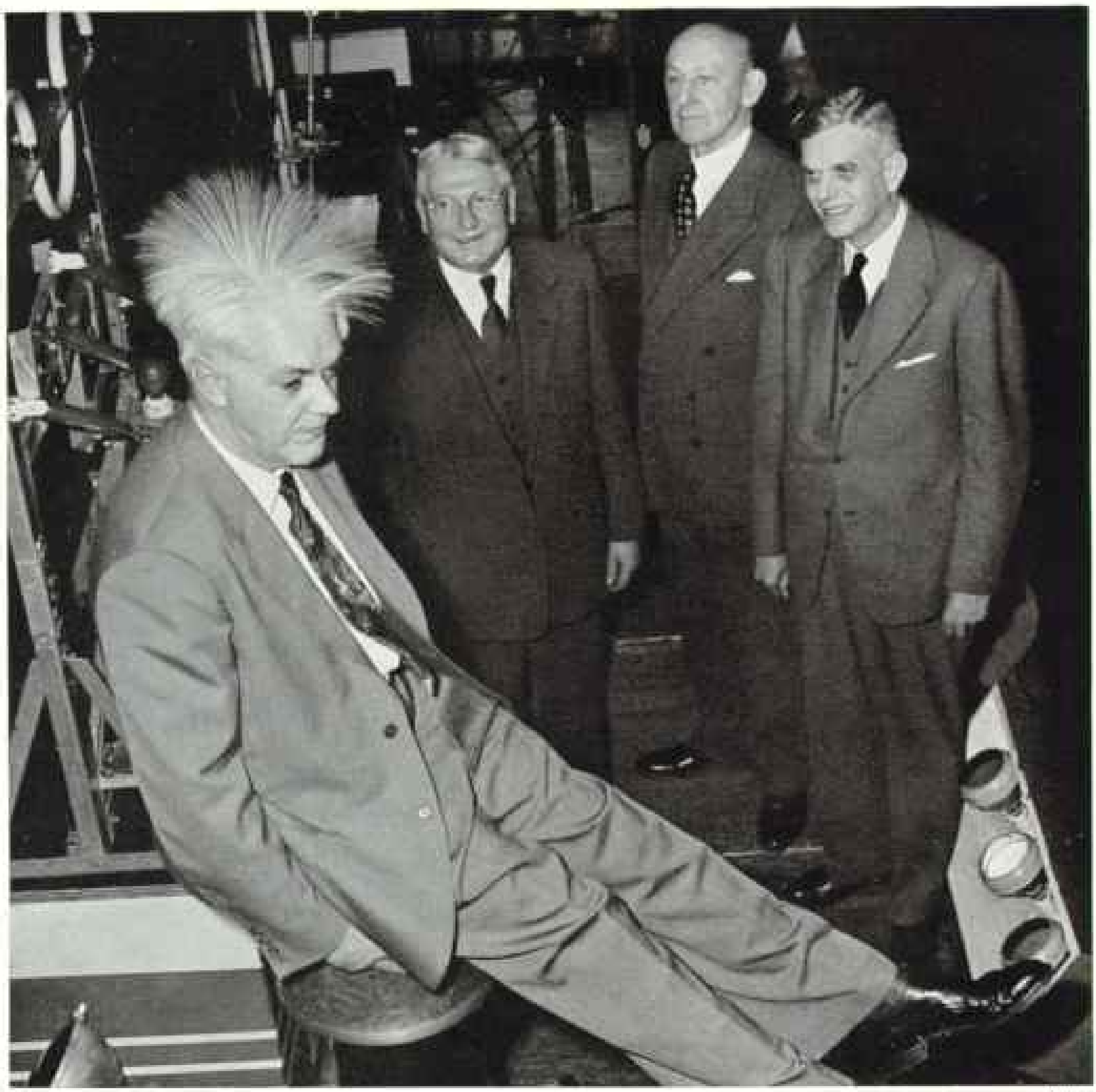
Lightning Gouged This 40-foot Trench

Three baseball players were killed when a bolt furrowed the infield during a game at Baker, Florida, in 1949. Fifty persons were injured. Ground's resistance to current "blew" the earth like a fuse.

With such man-made lightning engineers can reproduce all the effects of natural lightning on a power line, although not to full scale. They even have made a portable lightning generator that they took out into the country and used to hurl lightning at real power lines to see what happened.

As a result of all this experimenting, lightning nowadays seldom causes serious trouble for electric power companies.

Lightning has been classified into various types, though all really are essentially the



Acme

Lightning in the Offing Could Give a Man a Porcupine Hair-do

Richard Hitchcock, Westinghouse Electric Corporation research engineer, sits on a static generator and demonstrates its effect to members of the Chicago Association of Trade. Static electricity in a comb produces a related but milder spectacle. Just before a lightning stroke, the air becomes so charged that its electric content could raise the hair of a man on top of a tall building.

same. Streak lightning is the kind that is most often seen.

Sheet lightning is a discharge over a wide area, usually between clouds in the upper and lower parts of the atmosphere.

Heat lightning is ordinary lightning seen from too far away to hear the thunder that goes with it. Ribbon, beaded, and forked lightning are probably the same as streak lightning.

Many people have reported seeing "ball lightning," usually in the form of a luminous ball that rolls around inside a room or perhaps outside in the yard, usually disappearing after a few seconds with a loud report. Opinions differ on this, but some scientists think it is really just an "afterimage" retained for several seconds by the eye after seeing a brilliant flash of regular lightning. The loud report accompanying the disappearance of the "ball" could be just another thunderclap.

Lightning can occur in connection with tornadoes, volcanoes, dust storms, and snowstorms, or even as a "bolt from the blue" on days that apparently are cloudless.

A good thing to remember about lightning is an axiom stated by Dr. Karl B. McEachron of General Electric:

"If you heard the thunder, the lightning did not strike you. If you saw the lightning, it missed you. And if it did strike you, you would not have known it!"

New Northwest Map Completes the National Geographic Series of the United States

A NEW MAP of the Nation's great Northwest and neighboring Canadian Provinces goes to members of the National Geographic Society this month as a supplement to their June Magazine, completing The Society's detailed 10-color postwar series of the United States.

Members now have six sectional maps covering the entire country and much of Canada in great detail.

Wherever they travel in the United States or southern Canada, by road, rail, plane, on business or pleasure, they can plan their trip and follow their progress on this accurate, up-to-date series of maps.

The usefulness of this map collection for all who travel, even by armchair, emphasizes anew the importance of preserving the NATIONAL GEOGRAPHIC MAGAZINE and supplements. All six maps have been issued with The Magazine since the war ended: Northeastern United States, in September, 1945; Southeastern, in February, 1947; South Central, December, 1947; North Central, June, 1948; Southwestern, December, 1948; and now the Northwestern section, June, 1950.

The one-sheet National Geographic map of the United States, July, 1946, gives a useful and popular over-all picture on the scale of 78.91 miles to the inch.*

Pocket Atlas of 43,935 Place Names

Altogether, the six sectional maps would cover an area of more than 30 square feet. They contain a total of 43,935 place names. Yet this whole compendium of carefully compiled geographic knowledge is of handy size, the folded maps fitting neatly into pocket, glove compartment of car, or plane cockpit.

For thousands of members who will explore the wonders of their homeland this summer, the maps will form a ready, dependable guide. Red lines show important automobile roads; black lines indicate principal railroads. National parks, monuments, and other features of scenic, historic, or natural history interest are emphasized; also such man-made changes as new dams and resulting lakes.

These large, decorative, authoritative maps are widely used in home, school, business, and government offices. They may be mounted on wall or desk, or preserved in the convenient map case available for filing National Geographic maps, four of which are issued each year as supplements to the NATIONAL GEOGRAPHIC MAGAZINE.†

Except for the densely populated Northeastern section, where the map scale is 1:1,750,000, or 27.6 miles to the inch, the entire country is mapped in this series on a uniform scale of 1:2,500,000, or 39.5 miles to the inch.

Larger-scale insets provide greater detail on important areas in the two eastern sections and in the Northwest. The inset on the new map, "Northwestern United States and Neighboring Canadian Provinces," covers the vital Puget Sound region, from Olympia, Washington, to Vancouver, British Columbia, on a scale of 1:1,000,000, or 15.8 miles to an inch.

The main map covers all five States of the Northwest—Washington, Oregon, Idaho, Montana, and Wyoming, plus portions of seven more. It reaches north more than 300 miles into Canada to include the southern sections of three Canadian Provinces—British Columbia, Alberta, Saskatchewan—and a bit of Manitoba.

Huge Dams and Atomic Energy Plants

The vast area, one of the loftiest, most varied, and scenic on the continent, stretches from the Queen Charlotte Islands to Lake Winnipegosis and south to Shasta Dam in California, Salt Lake City, Utah, and Rocky Mountain National Park in Colorado.

On the map, 36½ x 25½ inches, appear 7,317 place names; 109 commercial and military airports are indicated by red stars.

All the maps of this postwar series include the important new developments brought about by the war and reflect population changes in the light of the U. S. Census Bureau's official estimates. In these respects, no part of the country was so tremendously affected as this Pacific Northwest region with its enormous power resources and war-spurred industries.

* Members may obtain additional copies of each of the six maps in this series (and of all standard National Geographic maps, including the general United States map) by writing to the National Geographic Society, Washington 6, D. C. Prices, in United States and Possessions, 50¢ each on paper; $1 on linen; Index, 25¢. Outside United States and Possessions, 75¢ on paper; $1.25 on linen; Index, 50¢. Copies of the United States map enlarged to 67 by 43½ inches may be had for $2 each in U. S. and Possessions, $2.25 elsewhere. All remittances payable in U. S. funds. Postage prepaid.

† Bound like a book, 7¾ x 10¾ inches, with maroon library buckram covers. The Society's handy map case will hold 20 folded paper maps of standard sizes or 10 folded paper maps with their indexes. Mailed in heavy carton, postpaid, upon application to the National Geographic Society, Washington 6, D. C. $2.50 in U. S. and Possessions; elsewhere, $2.75 in U. S. funds.

During the war and since, the Pacific coast has received the greatest migratory surge of population in the history of the Nation. Since the war the officially estimated population has increased 59 percent in Oregon, 58 percent in Nevada, 54 percent in California, and 49 percent in the State of Washington.

Such booming war industries as Seattle's airplane factories, Portland's shipyards, and Spokane's aluminum plants supplied the original impetus to this flood of people, but the movement has continued since the war. In Oregon, for example, the 34,100 businesses of V-J Day have increased to some 46,300.

Perhaps the most spectacular development is the great atomic energy establishment known as the Atomic Energy Commission Hanford Operations. Near these operations in Washington State have grown up the bustling atomic towns of Richland and North Richland with a combined population of more than 25,000. Now the Atomic Energy Commission is building another huge plant within the limits of this map, at Arco, Idaho.

Before the war not an ounce of aluminum was made west of the Rocky Mountains. Today nearly half of the country's total output is produced in Portland, Oregon, and in Tacoma, Spokane, and Vancouver, Washington, by electricity from the powerful Columbia River system.

More power is now being used from Bonneville and Grand Coulee Dams at peak periods than at the height of wartime production. Yet two more huge dams are being built in the area—McNary Dam, down the Columbia from Grand Coulee, and Hungry Horse Dam, in Montana on the South Fork of the Flathead River, a part of the Columbia system.*

The five States of Washington, Oregon, Idaho, Wyoming, and Montana have more than 20 percent of the Nation's developed hydroelectric power. In potential they contain 43 percent of the country's entire supply.

Grand Coulee's irrigation phase and O'Sullivan Dam, farther south, will irrigate some two million acres of semidesert land.

Logging Town Moves for Fifth Time

One of the world's best sources of timber is the Douglas fir forest, carrying the name of its most important species, which runs from the California-Oregon border north through British Columbia to Alaska.

Oregon and Washington together supply one-third of the country's total production of lumber and all of the softwood plywood, with the exception of California's seven percent.

In addition, their forests yield immense quantities of pulp for paper, and new wood by-products plants convert waste, such as sawdust, slabs, and edgings, into alcohol, tannin, fertilizer, cattle feed, and plastics. Sixty-five cents out of every dollar moving in these States has its source somewhere in the forest industries.

Shevlin, Oregon, foot-loose logging town of 600, is shown on the map in a new location. In 1947 it moved bodily for the fifth time in 26 years. Houses and stores were hoisted onto railroad cars for a 40-mile trip to a new stand of timber.

Wyoming Oil Well 3.9 Miles Deep

East of the Rockies, in Colorado, Wyoming, and Montana, promising discoveries of petroleum are being made, deep in the Cambrian layer, the earth's earliest sedimentary rock.

In Wyoming's new Pacific Creek field, the world's deepest oil well was drilled in 1949. It goes down 20,521 feet, or about 3.9 miles. Since 1940 Wyoming and Montana have more than doubled their oil production.

Canada has found extensive new sources of petroleum at Leduc, near Edmonton, at Golden Spike, 15 miles west of there, and at Redwater, north of the booming Alberta capital. Another field is at Hanna, 100 miles northeast of Calgary.

Almost entirely because of these dramatic new finds, Canadian oil production rose from 6.8 million barrels in 1947 to 11 million in 1948 and 22.1 million in 1949. Proved reserves have reached one billion barrels, and new discoveries are constantly being made.

To market Alberta oil, a new $90,000,000 pipe line is now being laid from Edmonton to Superior, Wisconsin. When finished early next year, this 1,150-mile line will be one of the world's longest.

A new development of major importance in this atomic age is the discovery of a huge supply of uranium ore in the Bear Lodge Mountains, north of Sundance, Wyoming.

Strewn over the map are picturesque place names, some eloquent of earthy pioneers and others of the Bible—Adam and Eve Rivers with Mount Cain between them, on the northern end of Vancouver Island; Three Fingered Jack, an Oregon peak; Crazy Mountains, Crazy Peak, and Loco Mountain, in Montana; Old Man on His Back Plateau, in Saskatchewan; and Sacajawea Peak, Oregon, named for the Shoshoni Indian girl who guided the explorers Lewis and Clark when they crossed this virgin empire to the Pacific less than 150 years ago.

* See "Montana, Shining Mountain Treasureland," by Leo A. Borah, in this issue of the NATIONAL GEOGRAPHIC MAGAZINE.

NATIONAL GEOGRAPHIC SOCIETY

GEOGRAPHIC ADMINISTRATION BUILDING

SIXTEENTH AND M STREETS NORTHWEST, WASHINGTON 6, D. C.

ORGANIZED FOR "THE INCREASE AND DIFFUSION OF GEOGRAPHIC KNOWLEDGE"

To carry out the purposes for which it was founded sixty-two years ago, the National Geographic Society publishes this Magazine monthly. All receipts are invested in The Magazine itself or expended directly to promote geographic knowledge.

Articles and photographs are desired. For material The Magazine uses, generous remuneration is made.

In addition to the editorial and photographic surveys constantly being made, The Society has sponsored more than 100 scientific expeditions, some of which required years of field work to achieve their objectives.

The Society's notable expeditions have pushed back the historic horizons of the southwestern United States to a period nearly eight centuries before Columbus crossed the Atlantic. By dating the ruins of the vast communal dwellings in that region, The Society's researches solved secrets that had puzzled historians for three hundred years.

In Mexico, The Society and the Smithsonian Institution, January 16, 1939, discovered the oldest work of man in the Americas for which we have a date. This slab of stone is engraved in Mayan characters with a date which means November 4, 291 B. C. (Spinden Correlation). It antedates by 200 years anything heretofore dated in America, and reveals a great center of early American culture, previously unknown.

On November 11, 1935, in a flight sponsored jointly by the National Geographic Society and the U. S. Army Air Corps, the world's largest balloon, *Explorer II*, ascended to the world altitude record of 72,395 feet. Capt. Albert W. Stevens and Capt. Orvil A. Anderson took aloft in the gondola nearly a ton of scientific instruments, and obtained results of extraordinary value.

The National Geographic Society-U. S. Army Air Forces Expedition, from a camp in southern Brazil, photographed and observed the solar eclipse of 1947. This was the seventh expedition of The Society to observe a total eclipse of the sun.

The Society cooperated with Dr. William Beebe in deep-sea explorations off Bermuda, during which a world record depth of 3,028 feet was attained.

The Society granted $25,000, and in addition $75,000 was given by individual members, to the Government when the congressional appropriation for the purpose was insufficient, and the finest of the giant sequoia trees in the Giant Forest of Sequoia National Park of California were thereby saved for the American people.

One of the world's largest icefields and glacial systems outside the polar regions was discovered in Alaska and Yukon by Bradford Washburn while exploring for The Society and the Harvard Institute of Exploration, 1938.

SHOWN ABOVE: 1. D-2—two matched diamonds in 14K natural or white gold case; $120; 2. JOANNE—14K natural gold-filled case and bracelet; $64; 3. JESSICA—14K natural or white gold case, gilt dial; $71.50; 4. GILBERT—14K natural gold case; $120; 5. DARRELL—10K natural gold-filled case; $57.75; 6. PERRY—14K natural gold-filled case; $71.50. At better jewelers. Prices include Federal Tax. All prices subject to change without notice. Hamilton's experience making railroad watches assures greatest accuracy in every grade. Send for FREE folder and revealing booklet, "What Makes a Fine Watch Fine?" Hamilton Watch Company, Dept. C-4, Lancaster, Pennsylvania.

Do you drink more coffee than you think you should ?

MUCH AS YOU love coffee, you know how the caffein in it can make people sleepless, nervous, irritable.

When you sleep poorly, or feel tense and jittery, you start thinking about the coffee you drink. Perhaps *you* should drink less of this tempting beverage. Perhaps *you* should stop drinking coffee altogether. You *needn't!*

DRINK SANKA COFFEE
REAL COFFEE - 97% CAFFEIN - FREE

When you drink *Sanka* Coffee you can enjoy *real* coffee—marvelous tasting coffee—and yet stop worrying!

For Sanka Coffee is *two* ways wonderful!

First of all, Sanka is delicious coffee. Rich and full-bodied, with the wonderful flavor—the satisfying, bracing cheer—that only *real coffee* can give you!

Second, Sanka Coffee is caffein-*free!* And that means *worry-free!* You can drink all the Sanka Coffee you want without the slightest question about caffein effect.

For 97% of the caffein has been removed from Sanka. It can't possibly keep you awake, or make you feel nervous or cross! Why not start drinking Sanka tomorrow?

Sanka Coffee

Real coffee with the worry taken out. Drink it and sleep!

Products of General Foods

YOU CAN BE SURE..IF IT'S Westinghouse

A THING OF THE PAST!

One of our engineers vowed a great vow.

Never again, said he, will my wife have to go through the ancient and accepted ordeal of defrosting.

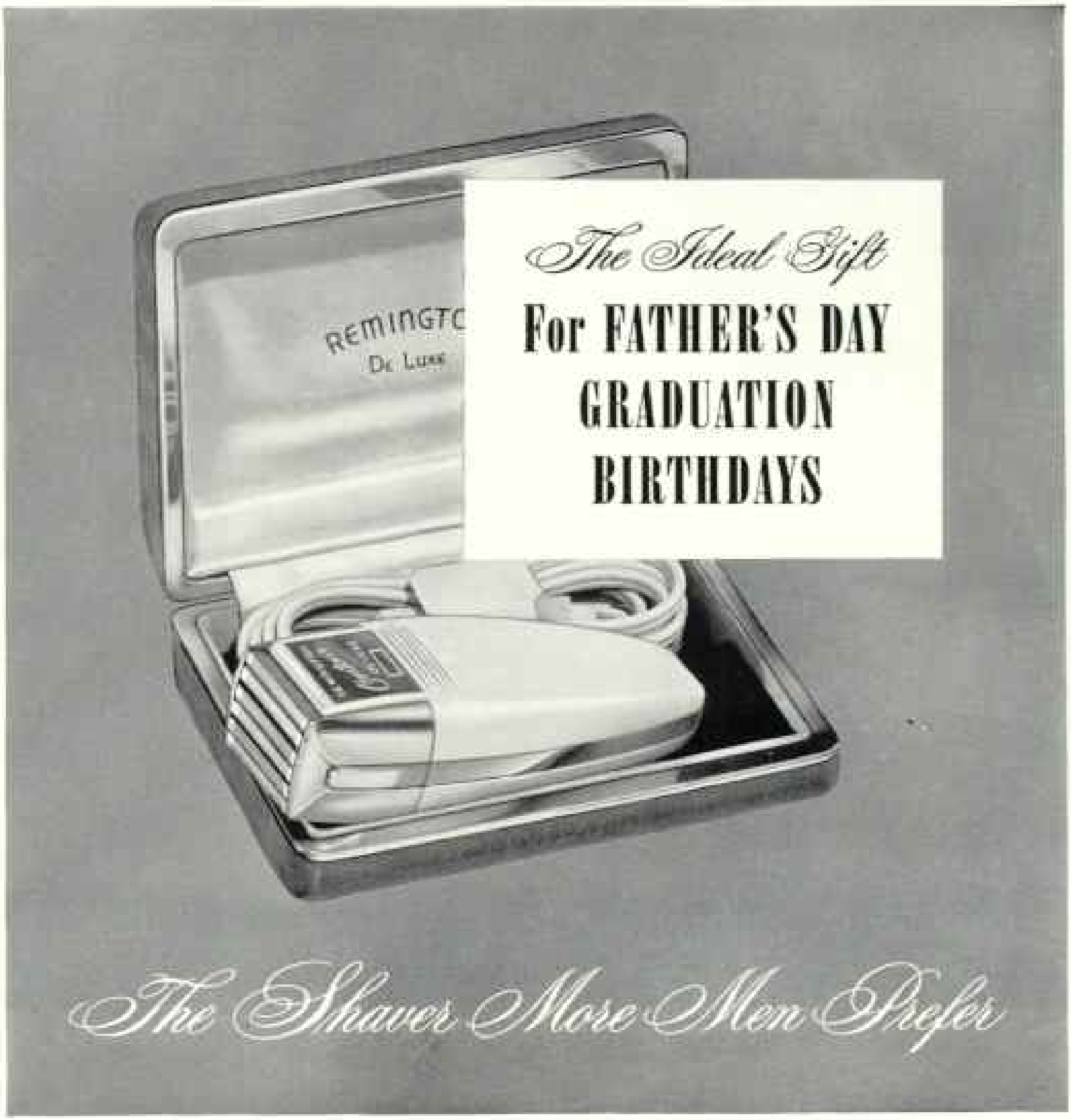
It doesn't make sense, said he, that in a country smart enough to put refrigerators in every kitchen, women should have to go into defrosting conniption fits because nobody ever really decided to prevent frost getting started.

Out of that vow came the new Westinghouse "FROST-FREE"* Refrigerator.

That name is literally true. Frost *doesn't get a chance* to build up in this refrigerator—because automatic things happen. And they happen so frequently and so fast that frozen foods and ice cubes stay solid through it all. No drippy trays to empty, no dials to set, no thermometers to watch. Efficiently and smoothly, the temperature is maintained at an even level that assures longer life, greater economy and safer, better foodkeeping.

Hundreds of thousands of kitchens are going to be blessed by their mistress' belief in the words we live by—You can be sure . . . if it's Westinghouse.

*Trade Mark



It's the practical gift with a luxury touch, perfect for Father's Day, Graduation, Birthdays, for every gift occasion—the Remington Contour DeLuxe Electric Shaver. No other shaver or shaving method gives such smooth, fast, *comfortable* shaves . . . even the toughest whiskers vanish like magic. In quality, in performance, and in styling, the Contour DeLuxe leads the field. It's an attractive, impressive looking gift he'll be proud to receive and you'll be proud to give. So, for the gift that keeps on giving shaving pleasure and convenience, select the world's finest shaving instrument—Remington Contour DeLuxe.

New, single-hinge, swing-back hair pockets make cleaning quicker and easier.

DIAMOND-HONED

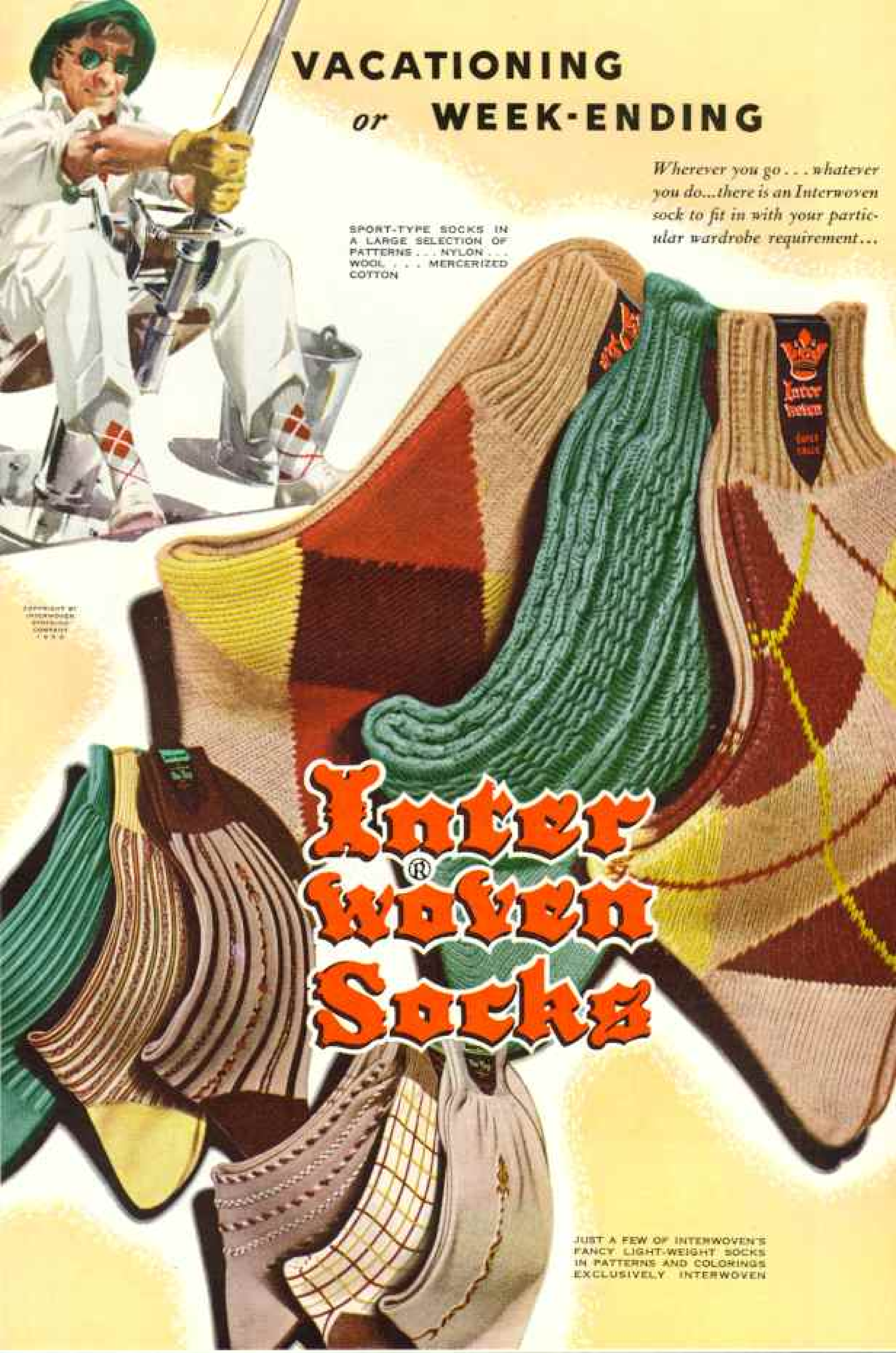
Remington

Contour

DE LUXE

ELECTRIC SHAVER

A product of **Remington Rand** — with Shaver Branches in 106 cities. See your local telephone directory.


VACATIONING
or WEEK-ENDING
Wherever you go . . . whatever you do...there is an Interwoven sock to fit in with your particular wardrobe requirement...
SPORT-TYPE SOCKS IN A LARGE SELECTION OF PATTERNS . . . NYLON . . . WOOL . . . MERCERIZED COTTON
Interwoven® Socks
JUST A FEW OF INTERWOVEN'S FANCY LIGHT-WEIGHT SOCKS IN PATTERNS AND COLORINGS EXCLUSIVELY INTERWOVEN

NOW—a new Bell & Howell easy-loading movie camera for only $129.50

Never before a real Bell & Howell at this low price with all these features: • Easy magazine-loading. Load and unload in *full daylight*. No threading, no bother • Low-cost operation. Uses inexpensive 8mm film • Exclusive Bell & Howell positive viewfinder. What you see, you get • Beautiful, modern design • Worthy addition to the fine family of Bell & Howell cameras • Guaranteed for life. During life of the camera, any defects in materials or workmanship will be remedied free (except transportation).

See it at your dealer's today!

You buy for life when you buy **Bell & Howell**

Chicago 45

Today's News—Today!

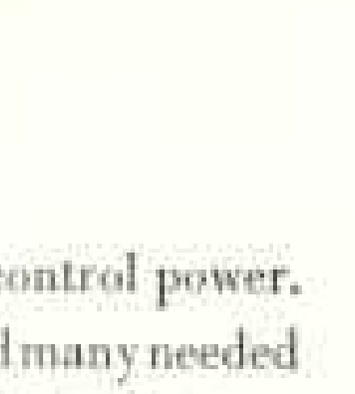
THE AMAZING SPEED and accuracy with which news comes to us are genuine tributes to the great newspapers, and the news services, to radio and television—and the people who staff them.

It's a story of communications. Radio flashes words—by voice or teletype—across continents and seas with lightning speed. Pictures move as fast. And today television and photography are used in a method to transmit instantaneously and reproduce full pages of printed, written, or illustrated matter in the *original form!*

Electronics is the basis of such speed. Special metals are required for the tube electrodes. Plastic insulations keep high frequency current in right circuits. Carbon's unique electrical and mechanical value is used to control power.

In supplying these materials, and many needed chemicals, UCC has a hand in getting the news swiftly to you. The people of Union Carbide also produce hundreds of other basic materials for the use of science and industry.

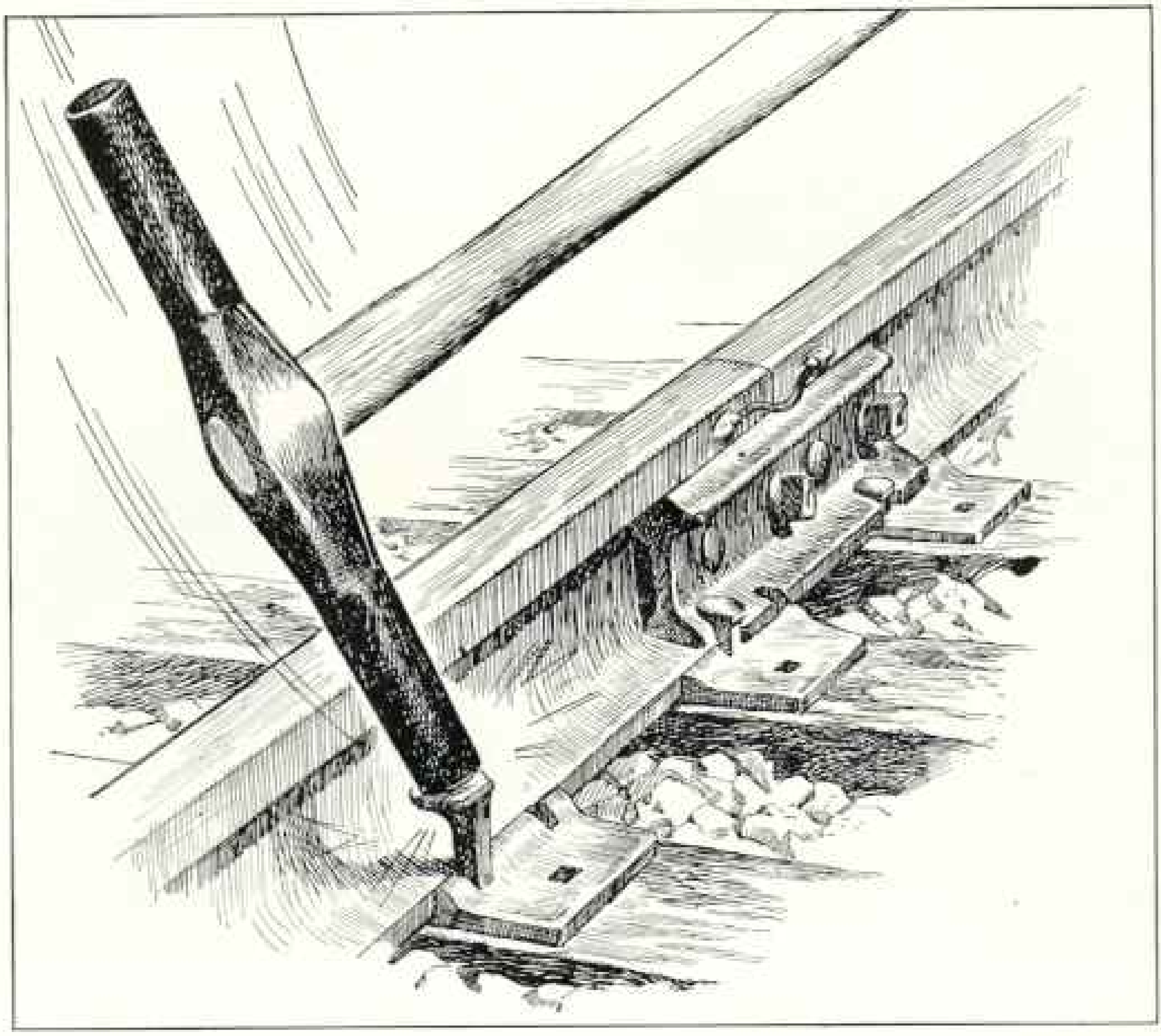
FREE: *If you would like to know more about many of the things you use every day, send for the illustrated booklet "Products and Processes." It tells how science and industry use UCC's Alloys, Chemicals, Carbons, Gases, and Plastics. Write for free booklet B.*



UNION CARBIDE
AND CARBON CORPORATION
30 EAST 42ND STREET NEW YORK 17, N. Y.

Trade-marked Products of Divisions and Units include

ELECTROMET Alloys and Metals · HAYNES STELLITE Alloys · SYNTHETIC ORGANIC CHEMICALS
BAKELITE, KRENE, and VINYLITE Plastics · NATIONAL Carbons · EVEREADY Flashlights and Batteries · ACHESON Electrodes
PRESTONE and TREK Anti-Freezes · LINDE Oxygen · PREST-O-LITE Acetylene · PYROFAX Gas



"George" doesn't do it for us!

Of all the forms of inter-city commercial transportation, only the railroads don't say, "let George do it."

Unlike their competitors . . . who have outgrown the "infant industry" stage, but who still rely on help from the people's tax dollars . . . America's self-supporting railroads pay all their own costs of doing business. And that is good news for "George."

For after all, who is this fellow "George" who is building and maintaining the highways, waterways and airways that other carriers use as a "place of business" for private gain? He is every taxpayer in America. "George" is . . . you!

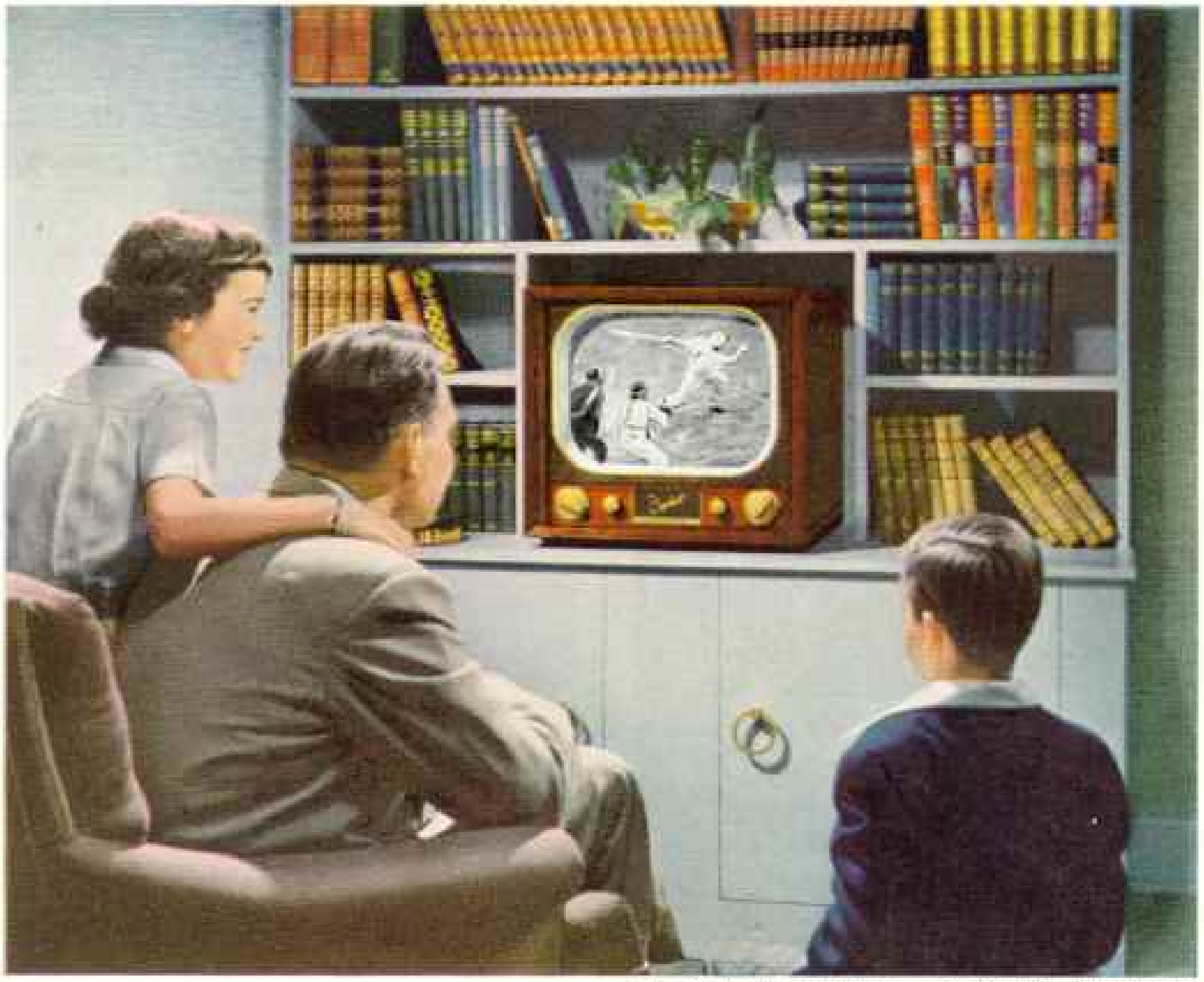
But you don't do it for us, "George." The railroads pay their own way . . . in the time-tested, traditional American way. It isn't easy . . . especially when we have to compete for business with subsidized carriers. But it's easier on you and your pocket-book, "George"! And it's better for our country, too. Because in the long run, private industries . . . like private citizens . . . must be independently self-reliant if America's greatness is to endure.

Ernest E. Norris

President

SOUTHERN RAILWAY SYSTEM

WASHINGTON 13, D. C.



The CAPEHART *"Wiltshire"—with 16-inch rectangular tube*

Today— IT&T *provides your finest home entertainment—* TELEVISION

by Capehart

You have never seen or heard television performance—at any price—comparable to the performance of these fine Capehart instruments. Incomparable Polatron† picture—plus Capehart's incomparable Symphonic-Tone System—these make the great difference. International Telephone and Telegraph Corporation, through its associate, *Capehart-Farnsworth Corporation*, brings you the *finest* in home entertainment. See, hear Capehart—priced from $269.95* upward—before making your decision.

Unrivalled Capehart tone is also available in new phonograph-radios!

**Plus tax. †T.M. Reg. Available at slight extra cost. Prices subject to change without notice—slightly higher South and West.*

International Telephone and Telegraph Corporation, New York

Beautifully new as a sedan!

The NEW handcrafted 1951

FRAZER

VAGABOND

For you ... sportsman, estate owner or commuter ... here is the *1951 successor* to the station wagon ... truly a car *built to better the best on the road!* The Frazer Vagabond fills the needs of all who require a handsome sedan on one trip and a large-capacity carrier on the next. For merchant, farmer, technician or professional man the Vagabond serves double use in transporting products or equipment. With its new Supersonic Engine (Hydra-Matic Drive optional at extra cost) and *handcrafted* quality the Vagabond has the performance and value to make it the year's smartest buy for smart people.

KAISER-FRAZER SALES CORPORATION, *Willow Run, Michigan*

Converts in 10 seconds from 6-passenger sedan to spacious carrier.

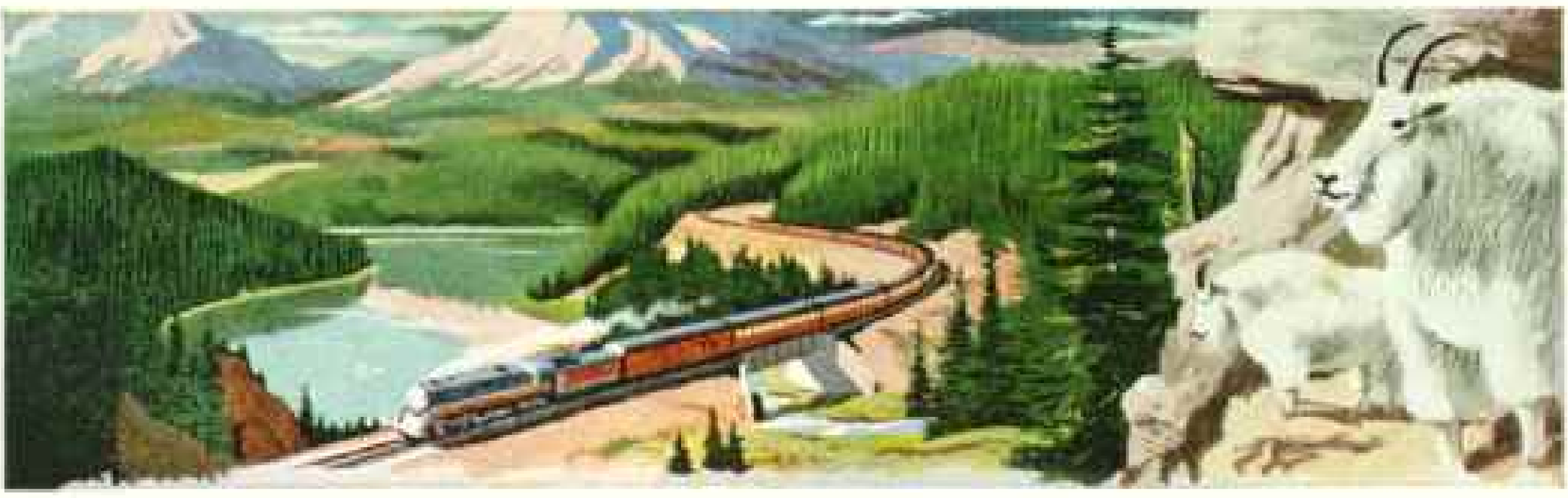
The Pride of Willow Run

Service round the globe — comfort round the clock

when you go — and stop —

Canadian Pacific

Sail to Europe aboard the all-new Empress of Scotland—another Canadian Pacific *White Empress* ship. A superb "holiday cruise." Fun all the way. Large, airy bedrooms, delicious meals; traditional Canadian Pacific service. Picturesque St. Lawrence River route means 1000 miles less open ocean!



See Canada's magnificent Rockies from a Canadian Pacific train. Wide berths...roomettes... modern accommodations...superb food. Thrilling scenery...towering peaks, rushing waterfalls. Nineteen modern Canadian Pacific hotels and resorts, like Banff and Lake Louise, invite you to stop over.

Fly to New Zealand and Australia in Canadian Pacific's pressurized planes. Arrive *refreshed*—you fly by day, sleep by night at Honolulu and Fiji. Hotel room, meals at no extra cost. Every courtesy aloft...grand food, too. *Empress* Airliners also fly the shortest route to Tokyo and Hong Kong.

Canadian Pacific

SPANS THE WORLD — Railways • Steamships
Air Lines • Hotels • Communications • Express

FOR INFORMATION ASK YOUR LOCAL AGENT OR CANADIAN PACIFIC IN PRINCIPAL CITIES IN U. S. AND CANADA

Another great G-E first! General Electric's

ALNICO MAGNETIC DOOR!

Available in 8- and 10-cu-ft sizes.

No latches! No slam! Each door seals *magnetically*. . . closes easily, quietly!

HERE'S *another G-E research achievement*, the new G-E Refrigerator-Home Freezer Combination with an Alnico Magnetic Door that seals itself tight to prevent the loss of precious cold air.

How is such a wonderful seal possible? The answer is in the G-E developed alnico magnets, which are placed end-to-end inside the Koroseal gasket. They grip the door shut . . . seal it *completely* all the way around!

G-E alnico magnets are *permanent*. They will last the lifetime of your refrigerator!

So dependable, too! More than 2,200,000 G-E Refrigerators are still performing faithfully after 10 long years. *Many as long as 15 and 20 years!*

See your nearest G-E dealer. He's listed in your classified directory, under General Electric Refrigerators.

General Electric Company, Bridgeport 2, Connecticut.

Watch the G-E Alnico Magnetic Door close easily, quietly. The G-E model NHX-106, above, has *two* magnetic doors . . . and a new foot-pedal door-opener for the fresh-food section. The home freezer stores up to 70 pounds of frozen food!

No more defrosting of the fresh-food section! Forget that weekly fuss! Frost just cannot accumulate in this compartment. Foods don't dry out, either! Has a fresh-food-storage capacity equivalent to a standard 10-cu-ft model.

NEW! REDI-CUBE ICE TRAYS

You pick cubes singly, or lift out as many as you want! It's a General Electric exclusive!

NEW! VEGETABLE ROLLA-DRAWERS

Drawers that roll in and out quietly at a touch! No channels or guides to clean!

G-E REFRIGERATOR-HOME FREEZER COMBINATION

A separate Refrigerator plus a separate Home Freezer

You can put your confidence in—

GENERAL ELECTRIC

AS LOWELL THOMAS PUTS IT:

"One of my greatest thrills can be enjoyed by every American!

★ "I've marveled at the splendor of the Taj Mahal, and gazed in awe at the mighty Himalayas. I'm not likely soon to forget Bagdad, Bangkok, Kabul—or forbidden Lhasa. Yet, to me, as an American, few places are as exciting as our own beautiful city of Washington.

"One thrill follows another as you tour the almost endless places of interest. Here, you feel the vigorous heart of our nation, and renew your appreciation of our way of life. So, this year of the Sesquicentennial celebration, visit Washington. To an American, there is no place like it!"

Lowell Thomas

TO MAKE THE MOST OF YOUR WASHINGTON TRIP

Start it on a B&O train. Enjoy the quiet gliding of Diesel power, and the restfulness of fine cars. And to the pleasures of Washington—described by Lowell Thomas—you'll add B&O's delicious food and friendly courtesy.

FREE—LET LOWELL THOMAS SEND YOU THIS 32-PAGE PICTORIAL WASHINGTON TRAVEL GUIDE

Paste on a penny postal card, and mail today.

Lowell Thomas
Box 341, 322 W. 57nd St., New York, N.Y.

Please send me, without charge, the Pictorial Washington Travel Guide.

(Please Print)

NAME _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____

BALTIMORE & OHIO RAILROAD

The only railroad between the East and the West passing directly through Washington

---

Don't give it a second thought carry

NATIONAL CITY BANK TRAVELERS CHECKS

Because they're universal currency . . . spendable at home or abroad for anything . . . accepted just like cash but safer. Promptly refunded if lost or stolen. Good until used. Cost 75¢ per $100. Buy them at your bank.

NATIONAL CITY BANK TRAVELERS CHECKS

BACKED BY THE NATIONAL CITY BANK OF NEW YORK

First in World Wide Banking

Member Federal Deposit Insurance Corporation

Exciting Summer Tours!

TO THE GLAMOROUS HOTEL **Jaragua** DOMINICAN REPUBLIC

AVAILABLE THROUGH SEPT. 30

via Pan American World Airways

TOUR No. 1

3 DAYS · 2 NIGHTS

$143.50 (½ double)
$145.50 (single)

• Round trip from Miami • Transfers upon arrival and departure from Ciudad Trujillo • Room and bath at hotel • 2 dinners—2 breakfasts • Sightseeing by private car around Ciudad Trujillo

TOUR No. 2

6 DAYS · 5 NIGHTS

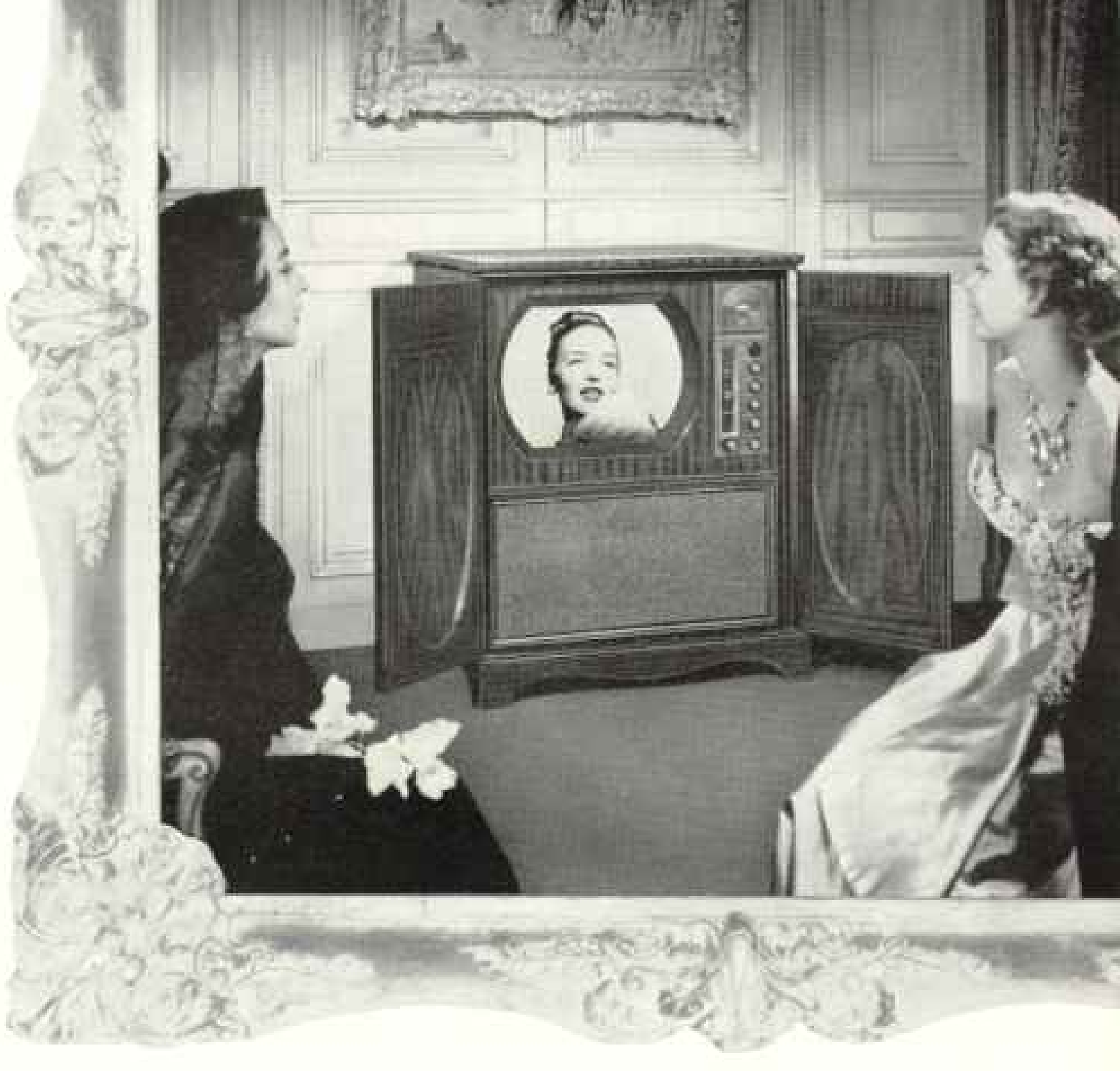
$189.50 (½ double)
$195.00 (single)

includes same as Tour 1 and in addition all dinners and breakfasts at hotel, box lunches on two all-day trips to San Cristobal and Latoma—and to Boca Chica Beach

For reservations and information consult travel agent or any Pan American office

N. Y. Office, 570 Lexington Ave., Tel.: PLaza 1-2371

THE DU MONT HANCOCK
19-inch direct view. Du Mont Lifetone tube. Hepplewhite styling. FM radio.*



FROM THE TELEVISION LABORATORIES OF DU MONT

these superb new instruments

From the same television laboratories that made commercial television practical
come the superb new Du Mont receivers.
In them you will see and enjoy the latest electronic advances.
The chassis—television's masterpiece—has been completely re-engineered
to give you pictures even more real, more life-like, more thoroughly satisfying.
There are five new models of these superb instruments,
each created in the Du Mont tradition of excellence.
See these new Du Monts to know what you can get
—and should get—in a television receiver.

THE DU MONT GUILFORD
12½-inch direct-view. Du Mont Lifetone tube. Distinguished cabinet. FM radio.*

THE DU MONT PUTNAM
12½-inch direct-view. Du Mont Lifetone tube. Table model. FM radio.*

First with the finest in Television— DUMONT

Cabinets designed by Herbert Rosengren • Your Du Mont dealer invites you to see The Morey Amsterdam Show, Du Mont Network

Cool retreat from sweltering heat

It may be sizzling outside, but you'll never know it with this handsome new Carrier Room Air Conditioner. All summer long it provides bracingly cool, clean air in gentle circulation —and humidity that's just right for comfort. You feel better, sleep better, work better. Made by men who know air conditioning best, it's simple to operate, quiet, easy to install. Economical, too, with more comfort per $ than any comparable investment. May be had in your choice of color, custom-matched to sample in six new models—window and console styles—that meet all space needs in home or office.

Feel fit and refreshed from now on this summer—call your Carrier dealer. He is listed in the Classified Telephone Directory. Carrier Corporation, Syracuse, N. Y.

AIR CONDITIONING Carrier **REFRIGERATION**

New-type glass for RCA television picture tubes filters unwanted light, to give sharper, clearer images.

Wayward light is disciplined—**for better television!**

Now television pictures gain still greater contrast and definition—through research originally initiated by scientists at RCA Laboratories.

Their discovery: That wandering light waves inside a picture tube—and inside the glass itself—may cause halation and blur an image's edges. By introducing light-absorbing materials into the glass, the wayward flashes are absorbed so that only the light waves which actually make pictures can reach your eyes!

Glass companies, following this research, developed a new type of glass for RCA . . . *Filterglass.* Minute amounts of chemicals give it, when the picture tube is inactive, a neutral tone. In action, images are sharper—with more brilliant contrast between light and dark areas. Reflected room light is also reduced.

* * *

See the latest in radio, television, and electronics at RCA Exhibition Hall, 36 West 49th Street, N. Y. Admission is free. Radio Corporation of America, RCA Building, Radio City, N. Y.

The new Filterglass faceplate gives you more brilliant pictures on today's RCA Victor television receivers.

RADIO CORPORATION of AMERICA

World Leader in Radio—First in Television

it's spring

IT'S

Motorola

portable time

They're brand new for spring—the best-looking, best-sounding little radios you've heard. The new Motorola portables play *anywhere*—outdoors on their own long-life batteries or indoors on ordinary house current. All are value-priced. See them soon!

JEWEL BOX, 5J1

Light and small . . . but it sounds like your living room console! And talk about beauty . . . its handsome jade-green and ebony plastic case will be "at home" in any room. Plays outdoors on battery or indoors on house current.

$29.95 less batteries

See—Hear them at your dealer today!

Prices slightly higher in South and West. Prices subject to change without notice.

20 YEARS OF ELECTRONIC ACHIEVEMENTS GUARANTEE MOTOROLA HIGH QUALITY

NOW...EXPRESS FIRST-CLASS SERVICE TO

Distinguished twin luxury liners

African Enterprise • African Endeavor

17 delightful days, New York to Capetown.
Unsurpassed accommodations, cuisine, service. $650 up

For complete information see your Travel Agent or

FARRELL LINES

INCORPORATED

26 BEAVER STREET • NEW YORK 4, N. Y.

Feather-Light and Tiny...

HEAR WITH A

RADIOEAR HEARING AID

small as a calling card - light as the average pocket watch or cigarette lighter - and a marvel of clarity! 63% lighter than early post-war models

Write for — FREE PRE-VIEW BOOKLET

E. A. MYERS & SONS, PITTSBURGH 16, PA.

Yes, send me FREE BOOKLET, "Radioear's Real Pocket Hearing Aids"

☐ My doctor recommends a hearing aid.

☐ I now wear a hearing aid. I prefer ☐ air conduction ☐ bone conduction

NAME _____

ADDRESS _____

Enchanted Isle

The charm and ease of 150 years ago still linger in this lovely island where the leisurely pace of by-gone days and brisk modern gayety are combined to give you the most rewarding holiday ever.

Clean, white sand beaches, warm ocean bathing, thrilling deep-sea fishing, yachting, golf and tennis are but a few of the attractions that await you. Visit stately old mansions, fascinating shops, the Artists' Colony, see America's only Summer Hunt Club. Modern hotels, comfortable inns, excellent restaurants.

Write for Free Illustrated Booklet. Dept. S.

NANTUCKET INFORMATION BUREAU
NANTUCKET, MASSACHUSETTS

NANTUCKET *Island*

Look what's attached to your Pullman ticket!

PEACE OF MIND
This comes from knowing you're traveling Pullman —the *safest* way there is to get places fast.

PRIVACY WHEN YOU WANT IT
Want to work, read, relax or just be alone with yourself? You *can* in your *private* Pullman accommodation.

COMPANIONSHIP WHEN YOU WANT IT
It's almost impossible to be lonely when you go Pullman. In the friendly Pullman lounge car you meet people you often keep as friends.

FOOD AS YOU LIKE IT
You eat when you want to, select the meal to suit yourself, in the railroad dining car.

A GOOD NIGHT'S SLEEP
Big, comfortable beds; clean, crisp linens; plenty of blankets—Pullman furnishes everything but the pleasant dreams.

HEART-OF-TOWN SERVICE
When you go Pullman you *depart and arrive* right in the heart of town.

THERE'S NO QUESTION ABOUT IT:
No other form of transportation considers your complete comfort so completely. No other kind of ticket gives you so much for your travel dollar.

Go Pullman

COMFORTABLE, DEPENDABLE, AND—ABOVE ALL—SAFE!

You'll have real fun IN PENNSYLVANIA!

Good times are a-comin' in. Boats are painted. Tennis courts are ready. Resorts are all spruced up. Yes, throughout Pennsylvania, folks are hard at work so you can play.

And there's a whole calendar of exciting events coming up: dances, regattas, tournaments, festivals, country fairs.

Come right now when hills and forests are at their freshest green, or make a date to spend the summer. You'll have real fun in the Poconos, at Eagles Mere in the Sullivan Highlands, Ligonier Valley, Erie, Conneaut Lake, Cambridge Springs, Wellsboro, Bedford, Bedford Springs, in the Northern Tier counties, in the Blue Ridge Summit area—everywhere in the Keystone State.

YOU'LL FIND MORE IN

Pennsylvania

JAMES H. DUFF
Governor

THEODORE ROOSEVELT III
Secretary of Commerce

PENNSYLVANIA DEPARTMENT OF COMMERCE
SUITE 208, HARRISBURG, PA.

I want to know more about Pennsylvania Vacation Lands. Please send me your new free booklet.

Name_____

Address_____

City_____ Zone_____ State_____

In frigid North or South seas sunny,
These handy cheques protect your money.

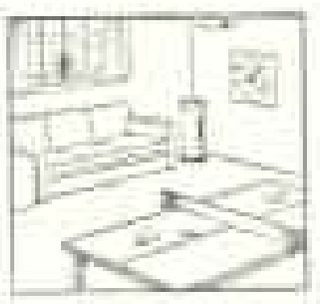
Always carry

BANK of AMERICA TRAVELERS CHEQUES

Issued by the world's largest bank, acceptable throughout the world. 75¢ per $100 at banks and travel offices everywhere.

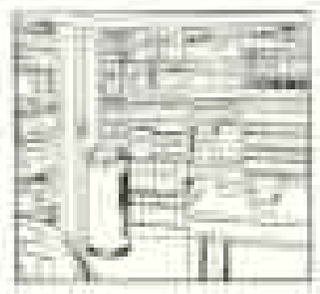
BANK OF AMERICA N. T. & S. A., CALIFORNIA
Member F. D. I. C.

Remove Damaging Moisture — Electrically!



No messy chemicals. No muss or fuss. Automatic protection for

- Game Rooms
- Libraries
- Workshops
- Laundry Rooms
- Storage Rooms



You'll be amazed how this new Frigidaire Dehumidifier drains moisture from the air automatically. It's inexpensive to run and easy to install. Call your Frigidaire Dealer. Or write for illustrated folder—Frigidaire Division of General Motors, 1444 Amelia St., Dayton 1, Ohio.

FRIGIDAIRE
Electric Dehumidifier

Have Yourself a SEE-LEVEL VACATION

...in air-cooled comfort and all-weather safety...

at New York Central's money-saving round-trip fares!

See exciting New York! Broadway shows and Fifth Avenue shops. Skyscrapers and museums. On the way, see the scenic Hudson from your Central window!

See the Adirondacks! World-famous resorts. Rugged peaks and lovely lakes. New York Central takes you through miles of this mountain wilderness.

See historic New England! Bunker Hill and Plymouth Rock. Seashore and mountains. And, on your way, see the beautiful Berkshires from your cool Dieseliner.

See Niagara Falls and Canada! Niagara's majesty. Old-World Quebec. And, on your way, see the Great Lakes or Mohawk Valley from your train window.

See Western Wonderlands! Deserts, dude ranches, the Rockies, California, the Northwest. Go New York Central's Water Level Route to western gateways!

FREE ILLUSTRATED VACATION GUIDE with fun map of playgrounds. Money-saving tips on luggage and round-trip fares. Send coupon to New York Central, Room 1144HH, 466 Lexington Avenue, New York 17, N. Y.

NAME _____

ADDRESS _____

CITY _____ STATE _____

NEW NEW YORK CENTRAL

The Scenic Water Level Route

Privacy as YOU like it on the Santa Fe

Room to Roam, too!

It's a private world of your own—your room on one of Santa Fe's great trains, whether it's a de luxe suite or economical roomette.

When you feel like roaming, there's a lounge car for friendly relaxation . . . and at mealtime, you choose from a Fred Harvey menu and eat from a table, instead of a one-choice tray.

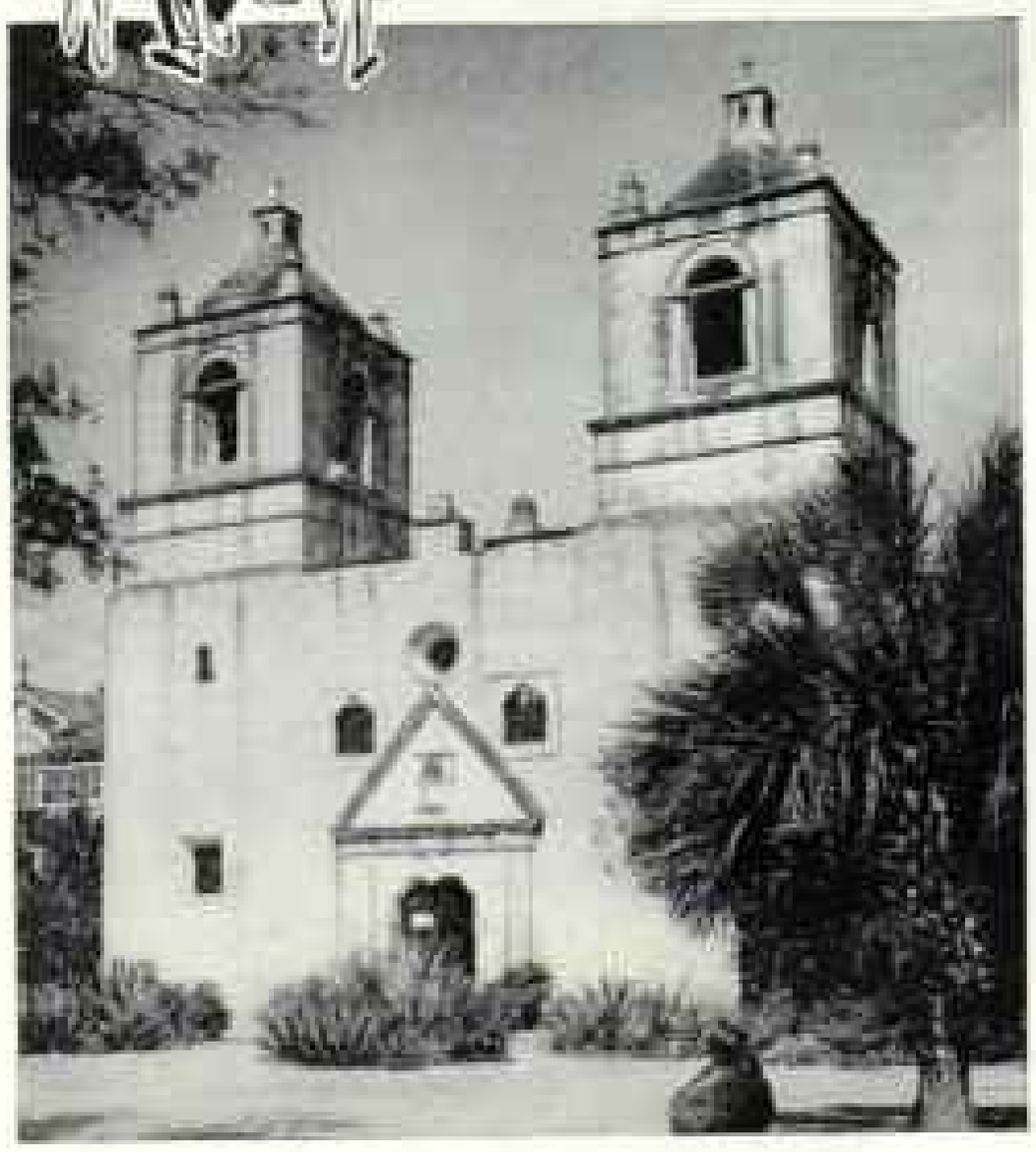
You board the Santa Fe downtown, not out in the sticks. You leave on schedule in any weather . . . see scenery and places en route at ground level...arrive safely, relaxed, refreshed. Yes, figure it out. You'll go Santa Fe—*all the way!*

Santa Fe

Ride great trains through a great country

K. T. Anderson, General Passenger Traffic Manager, Santa Fe System Lines, Chicago 4

San Antonio tells the Southwest Story



This summer, see the storied Southwest . . . and center your vacation in romantic San Antonio, where life is different. Stroll about the four ancient missions, the Spanish Governors' Palace and *La Villita*. Envision the days when adventurous *conquistador* and energetic *padre* planted the seed of Old-World culture in a wilderness. Stand in the silence of the far-famed Alamo and picture the fateful defense of those early heroes whose supreme sacrifice tipped the balance of history.

You'll find breath-taking beauty along the San Antonio River and rest and recreation in the numerous parks and plazas. Here is entertainment and fun galore, too . . . sports of all kinds . . . near-by dude ranches . . . lovely scenic drives.

Yes, to make that vacation perfect, headquarter in San Antonio. *On the Pan-American Highway to Old Mexico.*

San Antonio
WHERE LIFE IS DIFFERENT

Send For Free Book

MUNICIPAL INFORMATION BUREAU
710 Insurance Bldg., San Antonio, Texas

Name _____
Address _____
City _____ State _____

Handy Envelopes

FOR PAYING BY CHECK

200 QUALITY ENVELOPES
Printed with your name and address
$1.00 *Postpaid*

You can mail a lot of checks, coupons, or club, church, and P. T. A. correspondence with American Stationery's Envelope Package. And you can save a lot of time — each envelope is neatly printed with your name and address in rich blue ink. The envelopes are *new* and *improved* — they seal tight — quickly, easily. The paper is fine rag-content bond, of course. The quantity is 200. The price is only $1.00! Don't run short. Order *two* packages — have printed envelopes "right there" when you need them. A marvelous convenience.

Standard Package — $1.00

200 NOTE SHEETS (6 x 7) and 100 NEW, IMPROVED ENVELOPES. Ideal for informal and household business correspondence. All neatly printed.

Deluxe Package — $2.00

125 LETTER SHEETS (6½ x 10½) and 125 MATCHING ENVELOPES, all in *bouvier* paper. A distinctive correspondence paper. All neatly printed.

Order in quantities as listed. No "split-package" orders accepted. Maximum printing — 4 lines, 30 characters per line. Remit with order. West of Denver, Colo., and in U. S. possessions, add 10% to prices. (No foreign orders.) We pay the postage. *Satisfaction guaranteed.*

THE AMERICAN STATIONERY COMPANY
200 PARK AVENUE • PERU, INDIANA

American Stationery
THE FINE STATIONERY IN THE PLAIN BOX

Admiral

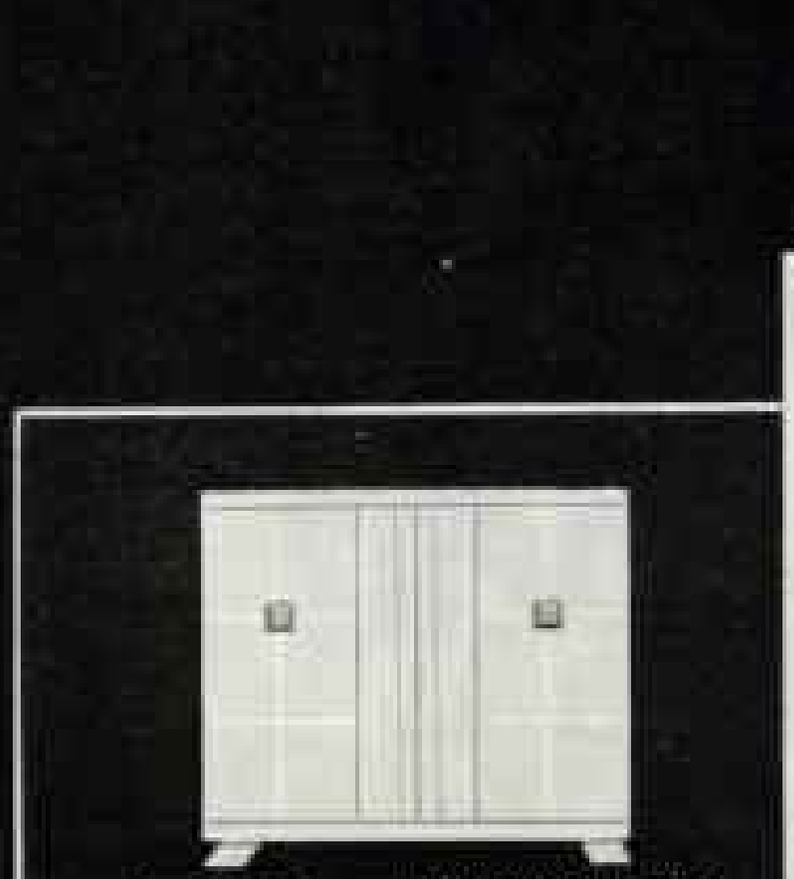
. . . exquisite in cabinet styling . . .

with ***MAGIC MIRROR TELEVISION***, engineered to outperform any set,

anywhere, any time . . . ***TRIPLE PLAY PHONOGRAPH*** that plays all records

automatically, and ***FM-AM DYNAMAGIC RADIO***. 12½, 16, 19 inch picture tubes . . .

from $179.95 to $775.00 . . . the greatest values in television, today!



Model 39X17 . . . with 19 inch Picture Tube

ON TV!—"LIGHTS OUT", NBC, Mon., 9 PM, EST
"STOP THE MUSIC", ABC, Thurs., 8 PM., EST

I Wear False Teeth

yet my mouth feels fresh, clean and cool— thanks to Polident!*

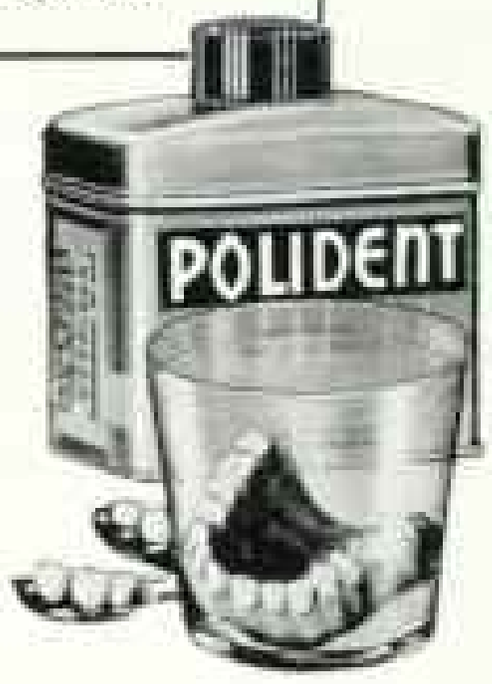
*"I know that dental plates that feel hot and sticky are a warning sign . . . so I soak my plate in Polident to avoid Denture Breath."

Mrs. C. W. A., Dayton, Ohio

What a wonderful feeling to have a plate that feels fresh, clean and cool from a hygienic Polident bath!

And how good it is to know that there's no Denture Breath to offend your family or friends.

Remember, dental plates need the special care of a special denture cleanser. Use Polident every day. It's quick, easy, economical, efficient—the world's largest selling denture cleanser.



Soak plate or bridge daily—fifteen minutes or more—in a fresh, cleansing solution of Polident and water.

No Brushing

POLIDENT

Recommended by more dentists than any other denture cleanser

Amazing New Cream Holds Tighter, Longer than anything you've ever tried or double your money back

POLI·GRIP

Made and guaranteed by POLIDENT

What to do . . . and what NOT to do . . . for

APPENDICITIS

MORE AND MORE PEOPLE are learning not to take a chance with a persistent stomach-ache or pain in the abdomen. As it might be appendicitis, *they call a physician at once!*

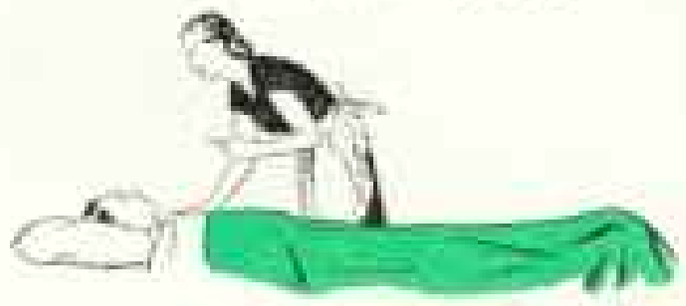
Aided by advances in medical science, the mortality rate from appendicitis has declined steadily every year for the past 12 years. Today, the removal of the appendix is a relatively simple and safe operation. The sulfa drugs and penicillin have also helped reduce deaths from appendicitis through prevention and control of complications which sometimes accompany the disease.

Prompt medical attention, however, is still the most important single step to complete recovery. For example, recent studies showed that when operations were performed within 24 hours after the first sign of an attack, more than 99 per cent of the patients recovered.

The Doctor says:

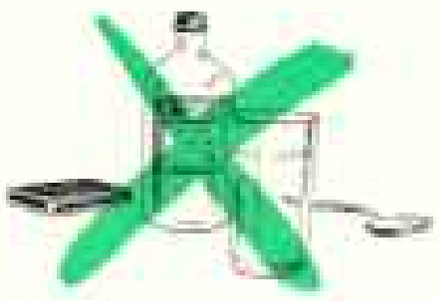
1. Appendicitis generally gives adequate warning—pain in the abdomen, sometimes accompanied by nausea, and usually settling after a time in the lower right side. Since the symptoms are not always the same, the wisest rule is: *Call the doctor at once for any persistent pain in the abdomen.*

Just lie quietly . . .



2. If appendicitis is suspected, serious complications can often be avoided by keeping the patient quiet until the doctor comes. Sometimes the pain may lessen or vanish, but this is no sign that danger is past. Only a doctor, using a blood count or other tests, can determine if appendicitis is present.

No medicines . . .



3. The use of laxatives, enemas, or any external pressure, may cause the appendix to rupture, thus spreading the infection. That is why it is always safest not to give the patient any home remedies or medicines, and to avoid rubbing or pressing the area which is painful.

Nothing to eat

4. Food and liquids put an extra strain on an inflamed appendix and may also cause it to burst. So, the patient should not have anything to eat or drink, until the doctor has made an examination.

A GALLERY OF MASTERPIECES

IN *Third Dimension Beauty*

There are now six Wallace Sterling designs by William S. Warren. Each is a work of art, sculptured to express a mood of beauty. Pictured above, from left to right, Grande Baroque, Sir Christopher, Grand Colonial, Stradivari, Rose Point, and the new "Romance of the Sea." Each is created in full-formed "Third Dimension Beauty"—beauty from every possible view—front, profile, and back. Each Wallace Sterling pattern is truly a treasure...distinctively beautiful...sought-after wherever fine sterling is sold. See all six Wallace Sterling "Third Dimension Beauty" designs before you decide upon your sterling silver. Six piece place settings from $27 to $38 including tax.

WALLACE STERLING *Silver*

Drink
Coca-Cola
Play
Refreshed
ICE COLD

Where you play

The pause that refreshes

with ice-cold Coca-Cola

With Kodachrome Film, you can make the most of each magic-filled day. You can keep the day-by-day action record in movies so colorfully "alive" they almost speak. You can accent all the happy high spots in crisp and gorgeous color stills.

Kodak movie cameras operate simply and surely . . . start as low as $79 for the new, compact "Reliant." Kodak miniature still cameras make color transparencies as easily as black-and-white snapshots. And Kodak's new "Pony 828" is only $29.95! At Kodak dealers. (Prices *include* Federal Tax.)

Eastman Kodak Company, Rochester 4, N. Y.

Show Kodachrome movies, big and beautiful, on your home screen.

Show Kodachrome stills on the same screen or with Kodak's amazing Table Viewer . . .

. . . or have them made into sparkling Kodachrome Prints.

Just slip movie film into Cine-Kodak Magazine Cameras . . . *set, sight, and shoot.* The "know-how" is built into the camera.

Kodak 35 with Range Finder—here's a still camera to ask about . . . to carry about. With this talented miniature, color stills are as certain as they are simple.

Kodak
TRADE-MARK

Here's High Adventure at Lowest Cost!

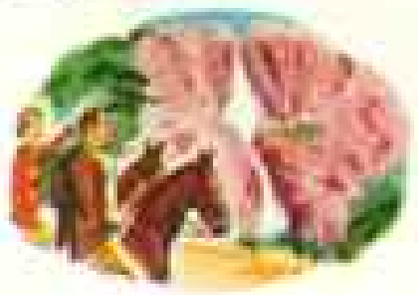
A GREYHOUND AMAZING AMERICA TOUR!

Here's a thrilling new kind of pleasure trip that's pre-planned by experts—one that will give you two days to two months of carefree vacation at any of the Nation's playgrounds, great cities, lively resorts.

Amazing America Tours are not conducted . . . you can travel alone, in a twosome, or with a group. Greyhound assures your *fun* and your *funds* by providing transportation, hotel accommodations, itineraries, and special sightseeing . . . all planned in advance! Mail coupon below to get details on sample tours listed . . . or for information about tours to any place that takes your fancy!

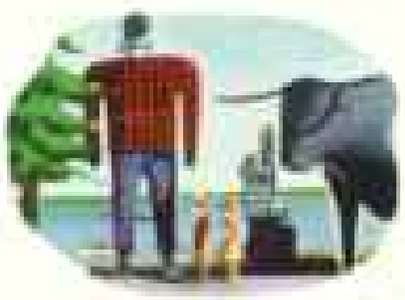
NEW YORK CITY

Four gay days of sightseeing at famous spots, three nights at smart hotel. $18.55*



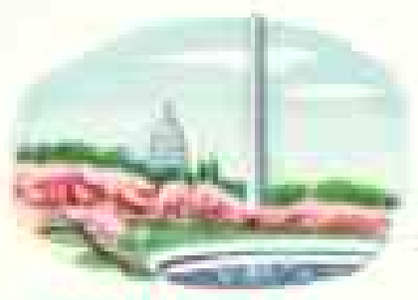
CALIFORNIA

Spend 3 wondrous days at Yosemite. Includes 6 meals, 2 nights at Ahwahnee Hotel. $47.00*



PAUL BUNYAN TOUR

Seven thrill-packed days of travel in Minnesota lake lands. Six nights' hotel. $35.75*



WASHINGTON

Four dramatic days of historic tours at Nation's Capital, 3 nights' hotel. $19.75*

Boston, 4 Days	$24.00*
Los Angeles, 4 Days	$13.25*
Colonial Virginia, 6 Days	$40.45*
San Francisco, 4 Days	$16.25*
New England Circle, 8 Days	$54.55*
Detroit, 3 Days	$12.10*
Denver, 3 Days	$13.00*
Florida, 11 Days	$72.10*
Salt Lake City, 2 Days	$ 8.50*
Mexico City, 8 Days	$65.15*

*To all the above prices, add Greyhound round-trip fare from your home town.

Note: Except where shown, prices do not include meals, or U. S. transportation tax. Prices include double-room (per person) hotel rates. All prices subject to change.

GREYHOUND

WRITE FOR FREE PICTORIAL FOLDER!

Greyhound Information Center, 135 W. Madison, Chicago 2, Illinois

Please send me a free folder about the tour in which I am interested.

MY TOUR PREFERENCE _____

NAME _____

ADDRESS _____

CITY _____ STATE _____

HG-8-50

The all new REMINGTON
PERSONAL TYPEWRITER

Here, at the fingertips' command, is all the speed . . . action . . . and performance found only before in an office typewriter. That's because 15 exclusive and plus value features—such as the *Simplified Ribbon Changer* and the *Larger Size Platen*—are engineered into this thrilling new *personal* typewriter. You can't match it for speed! . . . for performance! . . . for beauty of printwork!

SEE IT TODAY AT LEADING DEALERS, JEWELERS AND DEPARTMENT STORES

Only $84.50 with Miracle Tab and DeLuxe Carrying Case. Without Miracle Tab—$79.50. (Federal Excise Tax Extra.) Your dealer can arrange convenient payments.

Remington Rand
THE FIRST NAME IN TYPEWRITERS

with Amazing
MIRACLE
TAB *

Sets and clears tabulator stops from keyboard with a flick of the finger! *Flick up*—tab is set . . . *Press down*—tab is cleared. No other portable has this feature.

THE ONLY OFFICE TYPEWRITER IN PERSONAL SIZE

Camps

CULVER SUMMER SCHOOLS
on Lake Maxinkuckee. Eight weeks of Culver training in neatness, courtesy, promptness. Exceptional facilities. All sports. Three camps—Naval and Horsemanship (14-19); Woodcraft (10½-14). Separate catalogs. **59 Lake Shore Rd., Culver, Ind.**

FARRAGUT NAVAL CAMPS
SUMMER of adventure on Toms River for boys 8-18. Trips on 93-foot flagship. 42 activities. 2 gyms, 2 athletic fields. Remedial reading, tutoring, guidance, tutoring available. Moderate fee. Catalog. **Farragut Naval Camps, Box LC, Toms River, N.J.**

OGONTZ WHITE MOUNTAIN Camp for Girls, in New Hampshire. 6-18 in separate groups. 750 acres on mountain lake. Riding colony. Swimming, sailing, canoeing, sunbathing; form and trail riding; tennis, hockey, golf; art, crafts, music, dramatics. Trips. Tutoring. *Booklet.* **Abby A. Sutherland, Box 800, Ogontz School P. O., Pa.**

SUSQUEHANNA Boys 8-16. Mountain camp on private lake, New Milford, Pa. 32nd year. 715 acres. Daily riding, complete course in horsemanship. Five lake swimming. All other sports. Skilled leader for each 4 boys. Personal development our aim. *Booklet.* **Robert T. Smith, New Milford, Pennsylvania.**

Home Study

CALVERT "SCHOOL-AT-HOME"
Kindergarten through 9th grade. Sound schooling for your child wherever you live. Transfer to other schools, often with advanced standing. Daily lessons, books, supplies mailed anywhere in the world. Valuable advisory service. Start any time. Write for Catalog.
CALVERT SCHOOL
36 TUSCANY RD., BALTIMORE 10, MD.

It's Fun Learning Languages by Linguaphone
AT HOME, in leisure time, quickly, easily, correctly master Spanish, French, Italian—any one of 29 languages through proved Linguaphone conversational method. Send for FREE book.
LINGUAPHONE INSTITUTE
60-H Radio City New York City

Girls' Schools

CHEVY CHASE JUNIOR College. Accredited. Liberal Arts. General; Art, interior decoration, costume design and advtg. art; Home Ec.; Secretarial. Drama and music. New Science bldg. Riding. 48th year. *Catalog.* **Frances R. Brown, M.A., Pres., Box N, 6410 Connecticut Ave., Washington 15, D. C.**

EDGEWOOD PARK ACCREDITED College prep. Advanced courses in cultural and practical arts, fine arts, secretarial science, real estate, medical sec., home economics, dramatics. Interior decoration, indsg., kindergarten. Sports—riding, pool. Moderate rates. **Box N-10, Briarcliff Manor, New York.**

FAIRFAX HALL An old Virginia school in the famous Shenandoah Valley. Accredited 4 years high school, 2 years college. Liberal arts, fine arts, secretarial, music. Happy social life. All sports. Pools. Private stable. **Wm. B. Gates, Pres., Box N-506, Park Station, Waynesboro, Virginia.**

GREENBRIER COLLEGE FOR 118 years, a school for girls, in the southern manner. 2 yrs. H. S. 2 yrs. Standard College work. Art, Music, Dramatic Art, Secretarial. Modern fireproof student residence hall. Address: **French W. Thompson, Pres., Box N-50, Lewisburg, West Virginia.**

LASELL JUNIOR COLLEGE
PREPARES young women for living. 10 mi. from Boston. Guidance. Liberal arts, sec'l, home economics, retail training; art, music, drama, pre-professional. Tennis, riding, skiing; pool. *Catalog.* **Raymond C. Wass, 123 Woodland Rd., Auburndale 66, Mass.**

LINDEN HALL JUNIOR College and School for Girls. Cultural and Vocational. Music. Home Economics, Secretarial Studies. Fine and Commercial Art. Dramatic Art. Preparatory and General Courses. Beautiful Campus. All Sports. Riding. Swimming Pool. Moderate Tuition. **B. R. Harne, D.D., Box 66, Lititz, Pa.**

OAK GROVE
A FRIENDS SCHOOL FOR GIRLS

EXPERIENCED Preparation for College and Gracious, Purposeful Living. Music, Art, Speech. Grades 7-12; Intensive P.G. course for H.S. Grads. Joyous Outdoor Life. Riding included. Beautiful new fireproof Quadrangle.
Mr. and Mrs. Robert Owen, Box 140, Vassalboro, Maine

SAMUEL READY SCHOOL GIRLS 6-18. Boarding and day. Accredited. Preparation for college or vocation. Drama, music, arts and crafts. Secretarial. Family life emphasized. Share-the-work program. Daily chapel. Sports. *Catalog.* **Evangeline Lewis, 5118 Old Frederick Rd., Baltimore 29, Md.**

SOUTHERN SEMINARY & JR. COLL. Accred. Jr. College & H. S. for girls. Home Ec., Phys. Ed., Merchandising, Kind. Tr., Sec'y, Music, Art, Drama, Equitation. Swim pool. *Catalog.* 83rd Yr. **Margaret Durham Robey, Pres., Box 206-N, Buena Vista, Va.**

WALNUT HILL PREPARATORY and general courses. Superior scholastic training. Music, art. Country life on 65-acre campus 17 miles from Boston. All sports, riding, skiing. Founded 1857. Write for catalog. **Hester R. Davies, Principal, 30 Highland Street, Natick, Massachusetts.**

MARJORIE WEBSTER JUNIOR COLLEGE
In Nation's Capital. Accredited 2-year terminal and transfer courses in: Liberal Arts; Phys. Ed.; Kindergarten; Sec'l; Speech, Radio; Music; Fine and Commercial Arts; Mdsg. Pool. *Catalog.* **Box N, Rock Creek Park Estates, Washington 12, D. C.**

Coed Schools

DEAN ACADEMY & JR. COLLEGE
COED—2 & 4 YR. COURSES
LIBERAL ARTS for college prep or transfer. Music, speech, drama. **BUSINESS ADMIN.** special business training plus liberal arts background, full prep for business career, Sec'l, med. sec'l. **HOME ECONOMICS:** Unusually complete program includes home management house, instit. manage., foods, budget, clothing, latest equip. **ART,** fashion, int. dec., advertising and merch. **SMALL CLASSES,** complete guidance and placement service. Assoc. degree, homelike campus and traditions. All sports, pool, moderate rates. *Catalog.* **W. L. Garner, Pres., Franklin, Mass.**

OAKWOOD A FRIENDS SCHOOL
GRADES 8 through 12. Accredited college preparatory and general courses. Cool. Supervised work program. Sports. Skilful guidance. Country location 70 miles from N. Y. C. Moderate rates. 104th year. *Catalog.* **J. B. Shane, A. M., Principal, Box 10, Poughkeepsie, N. Y.**

SOLEBURY SCHOOL
SMALL friendly school for Boys and Girls 12-18. Separate campus for girls. Coeducational classes. Thorough preparation for college. Fully accredited. Usual sports. Riding. Art, Music, Dramatics. **W. P. Orrick, Headmaster, Box N, New Hope, Pa.**

Colleges for Women

CHRISTIAN COLLEGE ACCREDITED Junior College and Conservatory (A.A. degree). Terminal, transfer, pre-career courses. Music, Art, Drama, Secretarial, Nursing, Int. Dec., Costume Design, Home Mgmt. All sports, pool. 99th year. *Catalog.* **James C. Miller, Ph.D., Pres., Box D, Columbia, Mo.**

LINDENWOOD COLLEGE FOR women. A.B., B.S., B.M. degrees. Accredited. Modernized curriculum prepares for family and civic responsibilities. Counseling. Special work in music, art, radio. Sports. Near St. Louis. *Catalog.* **F. L. McCluer, Ph.D., Pres., Box 250, St. Charles, Mo.**

Colleges for Men

PENNSYLVANIA MILITARY COLLEGE
Senior college. 4-year degree courses. Business administration, arts, sciences (pre-medical, chemistry), engineering, C.E., I.E., E.E., M.E. Senior ROTC. Major, minor sports. Extensive social program. Guidance. Also non-military veterans' unit. 129th year. *Catalog.* Dean of Admissions, Dept. L, Chester, Pa.

Coed Colleges

COE COLLEGE One of the leading medium sized colleges of the country. A.B., B.M. degrees. Emphasis on liberal arts and music. Located in residence district of charming, small city. Dormitories, ample buildings and campus. Cool. Write for catalog. Address **Registrar, Box 160, Cedar Rapids, Iowa.**

Vocational

Bryant COLLEGE
CAMPUS TO CAREER IN TWO YEARS with a B.S. Degree
Founded in 1863. Bryant College offers men and women a unique accelerated program of business and cultural courses leading to a traditional 4-year degree in only 2 years.
BUSINESS ADMINISTRATION curricula include majors in Management, Accounting, Finance, Marketing, Merchandising, Salesmanship and Advertising.
EXECUTIVE SECRETARIAL curriculum includes majors in Merchandising and Advertising. Also 1-year Secretarial diploma.
Attractive dorms on campus. 22 buildings. Many athletic, social activities. Inspiring faculty. Effective lifetime placement service. Approved for Veterans. Write for catalog.
ENROLLMENT SECRETARY, PROVIDENCE 6, R. I.

FRANKLIN TECHNICAL INST.
Two-yr. courses: industrial chemistry, electricity, electronics; mechanical, structural, architectural design; automotive service; electric wiring. Pre-parastery class. 1-yr photography course. 42nd yr. Catalog. **33 Berkeley Street, Boston 16, Mass.**

INDIANA TECHNICAL COLLEGE
B.S. degree in 27 months in Aero., Chemical, Civil, Electrical, Mechanical, Radio engineering. Drafting. 1-year. Low rate. Earn board. Demand for graduates. Enter June, September, December, March. Ask for free catalog. **160 E. Washington Blvd., Ft. Wayne 2, Indiana.**

JAMESINE FRANKLIN SCHOOL OF PROFESSIONAL ARTS, INC. ADVERTISING Design, Fashion Illustration, Interior Architecture and Design, Painting and Illustration. Summer and Winter Sessions. Phone PLaza 5-3859. **Penthouse G, 460 Park Ave., New York 22, N. Y.**

KATHARINE GIBBS OUTSTANDING secretarial training for high school, private school graduates, college women. Resident facilities. *Catalog:* **Assistant Dean, 90 Marlborough St., Boston 16; 51 E. Superior St., Chicago 11; 230 Park Ave., New York 17; Providence 6; Montclair, N. J.**

KANSAS CITY ART INSTITUTE
AND School of Design. Complete professional instruction all branches of fine and applied arts. 13 new studios. All buildings modernized. Dormitories. 10-acre campus. Summer School. *Catalog.* Write **Dept. 1360, K.C. Art Institute, K.C. 2, Mo.**

Be a Hotel Hostess

Enjoy Your Work! Fascinating positions in hotels as Hostess, Executive Housekeeper, Manager. Resident classes now forming. Grade school education plus Lewis Training qualifies you. One student writes: "I am Business Manager and Hostess. Have attractive suite in addition to salary." Send for Free Book. *Approved for Veterans' Training. (16th year)*
LEWIS HOTEL TRAINING SCHOOL, Div. RSH-1101 Wash. 7, D. C.

NATIONAL COLLEGE OF EDUCATION COLLEGE education with special training for teaching Nursery School, Kindergarten, Primary and Upper Elementary Grades. 44th Year. Fall, Mid-year, Summer Terms. **Box 047G, Evanston, Illinois.**

WHY DON'T YOU WRITE?
Written short stories, articles on business, travel, homemaking, hobbies, local and club activities, etc., will enable you to earn extra money. In your own home, on your own time, the New York Copy Desk Method teaches you how to write the way newspaper men learn—by writing. Our unique "Writing Aptitude Test" tells whether you possess the fundamental qualities essential to successful writing. Write for it, without cost or obligation.
Course approved for Veterans' Training.
NEWSPAPER INSTITUTE OF AMERICA
Suite 3360-H, One Park Avenue, New York 16, N. Y.

TRI-STATE COLLEGE

B. S. Degree in 27 months in Civil, Elec., Mech., Chem., Aero., Radio and Telev. Engineering; Bus. Adm., Acct. Visit campus, see well-equipped labs. Grads successful. Founded 1884. Enter June, Sept., Jan., March. Low cost. Prep courses. Catalog. **1460 College Ave., Angola, Ind.**

Boys' Schools

ADMIRAL BILLARD ACADEMY

Accredited. Graduates in all gov't academies and leading colleges. Highest Navy Dept. rating. Small classes, all sports, Naval training, uniforms, waterfront activities, private beach. Junior School. Also summer camp, school. **Box N, New London, Conn.**

ARMY AND NAVY ACADEMY

Fully accredited. Located immediately on the ocean 60 miles south of Los Angeles. A successful guidance program. **Camp Pacific.** Write for regular catalogue or camp folder. **Colonel W. C. Atkinson, Box N, Carlsbad, California.**

AUGUSTA

★ MILITARY
★ ACADEMY
★ FT. DEFIANCE
★ VIRGINIA

"Take it to The Big Boy."

Distinguished ROTC school. Junior and Senior schools. Accredited. All sports, including lacrosse and fencing. Large pool, gym. 1400-acre campus. 67th year. Rate $900. Write for catalog N. **Col. Chas. S. Roller, Jr., Principal.**

THE BAYLOR SCHOOL

Accredited scholarship. College prep since 1893. Boys 12-18. Semi-military. Endowed awards. Ideal location, modern facilities. New gym. Championship athletics. Summer camp, boys 8-13. Catalog. **103 Cherokee Road, Chattanooga, Tennessee.**

BLACK-FOXE MILITARY

Approved by parents. Accredited college prep—all grades through high school—in healthful climate. High standards. Small classes, individual progress. Year-round outdoor sports, open-air meals. Catalog. **640 N. Wilcox, Los Angeles 4, Calif.**

BLAIR ACADEMY

Well-established Reputation for Thorough College Preparation. Small Classes. Experienced Masters. Grades 7-12. Modern Equipment on Country Campus, 5 miles from N. Y.C. Swimming Pool, Golf Course. Est. 1848. **Benjamin D. Ruman, Headmaster, Box 17, Blairstown, New Jersey.**

BLUE RIDGE SCHOOL

For boys, in picturesque, healthful western North Carolina. Accredited preparation for leading universities, in cultured Christian environment. Individual instruction and guidance. Grades 5-12. Write for catalogue. **J. B. Sandifer, Box 548-N Hendersonville N. C.**

BOLLES

Fully accredited. Distinguished academic record. Upper, lower schools, grades 6-12. New conference-type classrooms. Guidance, remedial reading. Varsity and intramural sports for all in healthful Florida climate. Year-round golf, tennis, sailing. Outdoor pool. Military or naval training. Catalog.
Registrar, Box 5037-N, Jacksonville, Florida.

BORDENTOWN MILITARY

Fully accredited. College preparatory. Business and general courses. Outstanding record of college entrance. ROTC. Boys taught how to study. Junior school. 65th year. Summer session. Catalog.
Registrar, Box 656, Bordentown, New Jersey.

CARTERET SCHOOL

Sixty-mile College Prep. Accredited. All grades to college. Separate Jr. School. Small classes. Personal supervision. Periodic Aptitude tests. Homelike dormitory. Large gym, athletic field. 40 acres atop Orange Mt. 20 mi. to N.Y. Request Bulletin N. **Carteret School, W. Orange, N.J.**

CASTLE HEIGHTS

MILITARY Accredited

Preparation for College and Government Academies. Junior School in separate unit. Boys taught to study and inspired to excel. Highest Standards. 36 M. S. T. P. 11 modern buildings. Every boy in athletics every day. Outdoor sports year-round. Endowed. Swimming pool, golf, aviation. Summer school and camp. For catalog and "52 Facts," address:

Col. H. N. Armstrong, Pres., Lebanon, Tenn. (Near Nashville)

CHAUNCY HALL SCHOOL

Specializing in preparation for M.I.T. and other engineering schools. Emphasis on mathematics, English, sciences. Part enrollment, 40 states, 40 countries. Est. 1828. Write: **R. D. Farnsworth, 552 Boylston Street, Boston, Massachusetts.**

COLUMBIA MILITARY ACADEMY

22 buildings, built by U.S. Gov't. Fully Accred. R.O.T.C. Preparation for Gov't Academies, Jr. School. All sports. Large new gymnasium with tiled pool. 50-piece band. Summer session. Write for catalog. **Dept. N, Columbia, Tennessee.**

CULVER MILITARY ACADEMY

on Lake Maxinkuckee. Emphasis on physical, intellectual, moral stamina. Thorough preparation for college. Leadership training. Senior R.O.T.C. Artillery, Cavalry, Infantry, and Band. All sports. Catalog. **69 Pershing Rd., Culver, Indiana.**

DARLINGTON SCHOOL FOR BOYS

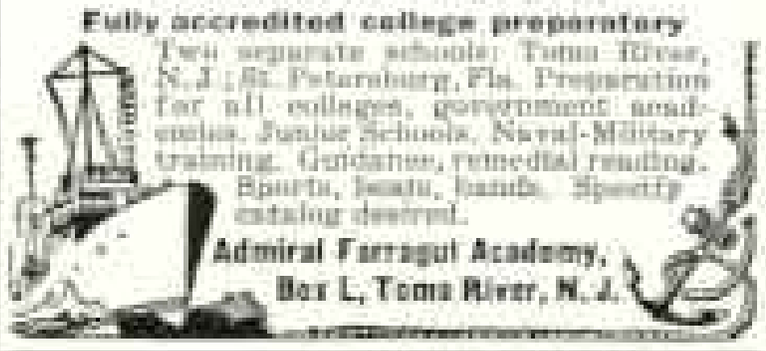
Fully accredited. Individualistic instruction—highest standards. Christian character developed. In foothills. Lookout Mt. range. Sports. Dairy farm. For catalog, address: **C. R. Wilcox, Ph.D., Pres., Box N, Rome, Ga.**

ELGIN ACADEMY

Prepares for leading colleges. Grades 7-12. Small classes. Excellent faculty. Coeducational. Well-balanced activity program. Gymnasium, pool, art gallery, music, dramatics. Sports for all. Near Chicago. Endowed. Est. 1839. Catalog. **E. P. Broste, 117 Academy Place, Elgin, Ill.**

FARRAGUT

Fully accredited college preparatory



Two separate schools: Toms River, N.J.; St. Petersburg, Fla. Preparation for all colleges, government academies. Junior Schools. Naval-Military training. Guidance, remedial reading. Sports, boats, bands. Specify catalog desired.

Admiral Farragut Academy, Box L, Toms River, N. J.

FISHBURNE MILITARY SCHOOL

Accredited college prep emphasizing scholastic excellence. Develops sound minds, strong bodies, self-reliance. All sports. Tac session. Outstanding faculty, individual guidance. Many social, extracurricular activities. ROTC. Highest govt. rating. Catalog.
Col. M. H. Hudgins, Box N, Waynesboro, Virginia.

FLORIDA MILITARY ACADEMY

One of the outstanding schools of the South. Fully accredited. R. O. T. C. Separate Junior School. Individual attention. Limited enrollment. All-inclusive rate $1,095. **Col. Walter B. Mendels, President, Box 1, St. Petersburg, Florida.**

FORK UNION

★ MILITARY ACADEMY

★ Emphasis on character, personality, academic excellence. Accredited preparation, also post-grad, for college. Business. Small classes. ROTC. Highest Gov't rating. 16 modern buildings. Superb new gym, sports, bands. Also LOWER SCHOOL (Grades 1-7). Separate buildings, gym. Complete supervisory staff. Summer School. 53rd year. Catalog.

★ **Dr. J. C. Wicker, Box 306, Fork Union, Va.**

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

GEORGETOWN PREPARATORY SCHOOL

Oldest Catholic Prep School in U. S. (1789). Under Jesuit Fathers. Accredited. 7th grade through High School. 90 acres of campus. 12 miles from downtown Washington. For catalog address **Rev. Wm. N. Maloney, S.J., Hdmr., Garrett Park, Md.**

GREENBRIER MILITARY SCHOOL

Upper Year. Accredited Lower School, High School, Junior College. Fireproof connected bldgs. All sports. Elevation 2300 feet. Summer Camp. For Catalog & "Evidence" address: **Col. D. T. Moore, Registrar, Box N, Lewisburg, West Virginia.**

GEORGIA MILITARY ACADEMY

8 mi. from Atlanta. Accredited. Senior R. O. T. C. Winter, Summer School. Mild climate.

Courses—College and West Point-Annapolis Prep.
Junior College—Liberal arts and Bus. Admin. courses.
Aviation—Instruction given both in theory and flying.
Junior School—Separate department for 100 young boys.
Athletics—Expert coaches develop teams in major sports.
Home Life—Cadets live with their teachers.
Training here for leadership. Moderate rates.
Highest Government Rating. **Write:**

Col. W. N. Brewster, College Park, Ga.

THE GUNNERY

Founded 1850 as "Mr. Gunn's School." College preparatory; 125 boys; strong faculty of 15 men; small classes. Athletics for all include 4-oared racing crews. Ideal Connecticut village location. **Ogden Miller, Headm., Box N, Washington, Conn.**

HARGRAVE MILITARY ACADEMY

Accredited College Prep and Jr. Sch. (6th grade up). Individualized program for each boy develops his mental, moral, physical, social and spiritual qualities. Christian faculty. Catalog. **Col. A. H. Camden, Pres., Box 306, Chatham, Virginia.**

HOWE MILITARY SCHOOL

Thorough academic training in spiritual environment. Accred. college prep. Potential achievement rating gives each boy a goal. Jr. school. Sr. ROTC. Sports. Episcopal. Est. 1884. Summer Camp. Catalog. **R. B. Bouton, 960 Academy Pl., Howe, Ind.**

THE HUN SCHOOL

Thorough college preparation for boys amid cultural advantages of a famous university town. Grades 9-12. Emphasis on development of initiative, responsibility. Small classes. Catalogue. **Frederick G. Richards, 20 Winant Road, Princeton, New Jersey.**

KEMPER MILITARY SCHOOL

High School and Junior College. 100th year. Accredited education with military training. ROTC. Small classes. Varied cultural program. Sports for all. Pool. New stadium, gym. Catalog. **Dir. of Adm., 1060 Third St., Boonville, Mo.**

KENTUCKY MILITARY INSTITUTE

A School with a winter home in Florida

Preparation for college under ideal climatic conditions all year. Oldest private Military School in America. For fully illustrated catalog and "Why Florida" folder, address:

Col. C. B. Richmond, Pres. Box N Lyndon, Ky.

LAKEMONT ACADEMY

Eighth grade through high school. Excellent record preparing boys for college. Small classes. Homelike atmosphere. All sports, boating. Riding in fee. 100 acres overlooking beautiful Seneca Lake. Near Watkins Glen. Accredited. **Box N, Lakemont, New York.**

LANDON SCHOOL

Strong college prep. Small study groups. Limited enrollment. Student government honor system. 75-acre wooded campus closely suburban to Washington. Sports. Catalog. Write **Paul L. Banfield, Headmaster, Box N, Bradley Lane, Bethesda, Washington 14, D. C.**

LA SALLE MILITARY ACADEMY

Foremost Catholic military school under Christian Brothers. Accredited college preparation. Grades 9-12. Small classes. Senior ROTC. Beautiful 148-acre campus, 67th year. 50 miles from New York City. Catalog. Write **Box G, Oakdale, Long Island, New York.**

MANLIUS

Accredited college preparatory, 7th and 8th grades. Military, ROTC. Band. Ski platoon. Tutorial assistance included. Close supervision of study. Students grouped according to scholastic ability. Fall, winter, spring sports program. In beautiful central New York. 138-acre campus. For "Tutorial Method" and catalog, address: **Robert N. Weeks, Director of Admissions, Manlius School, Manlius, New York.**

MASSANUTTEN MILITARY ACADEMY

Founded in 1899. In Shenandoah Valley. College preparatory; fully accredited. Individual instruction. R.O.T.C. Junior School. Band, Glee Club, music instruction. Address: **Box N.G., Woodstock, Va.**

McDONOGH

One of the nation's best equipped college prep schools for boys. Also business and terminal progs. Grades 1-12. Small classes. Endowed. Semi-mil. Separate dorm for younger boys. Sports. 800 acres, 12 mi. Baltimore. Catalog. **Maj. L. E. Lamborn, Box 106, McDonogh, Maryland.**

MERCERSBURG ACADEMY

GRADUATES outstanding in leading colleges. Grades 9-12. Public speaking emphasized. Guidance, remedial reading. 300 acres in central Penna. 11 tennis courts, pool. Summer session. Est. 1893. Catalog. **C. S. Tippetts, Box N, Mercersburg, Pa.**

MILLARD SCHOOL

Unique pre-college training. Full high-school course completed in two years by boys able to benefit by instruction under successful Millard system. Personal training. Catalog. **Col. Homer S. Millard, Box N, 1918 N St., N. W., Washington 6, D. C.**

MILLERSBURG MILITARY INSTITUTE

In the Heart of the Blue Grass. Fully accredited. 57th Year. College Preparatory and separate Junior School. New gymnasium. For catalog, address: **Colonel W. N. Nelson, Superintendent, Box 1650, Millersburg, Kentucky.**

MISSOURI MILITARY ACADEMY AND JUNIOR SCHOOL

65th yr. Fully accredited. R.O.T.C. Individualized instruction teaches boy How to Study. Complete guidance program prepares for future. All sports. 5 athletic fields. 200 ac. campus. Riding. Catalog. **Col. C. R. Stribling, 960 Main St., Mexico, Mo.**

MORGAN PARK MILITARY

Character development of every boy. Fully accredited college prep. High academic standards. R.O.T.C. Sports. 15 miles from Chicago's advantages. Lower School. 77th year. Catalog. **Director of Admissions, Box 760, Morgan Park, Chicago 43, Ill.**

THE SCHOOL OF DISTINCTION

NYMA

Est. 1889
Highest War Dept. Rating

Renowned for character building, physical development, high scholastic standing. Graduates destined for leadership, successful at all well-known colleges. Experienced faculty. Junior School. Infantry, Cavalry, Artillery, Band.

New York Military Academy—77 Academy Ave., Cornwall, N. Y.

NORTHWESTERN MILITARY AND NAVAL ACADEMY

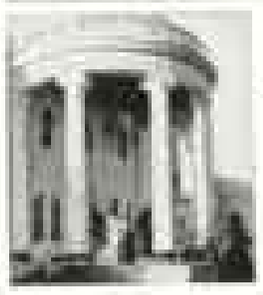
Builds character while preparing boys for college. Accredited. Small classes. Tutoring. ROTC. All sports. On Lake Geneva, 75 mi. Chicago. Summer camp. 42nd yr. Catalog. **56 Lake Shore Rd., Lake Geneva, Wis.**

OHIO MILITARY INSTITUTE

Insists on the best in your boy. Large faculty, small classes. Lower School for Younger Boys. 119th year. Certificate to Colleges. High, healthful location. Music, sports, new armory. Write: **Col. A. M. Hanshaw, Box N, College Hill, Cincinnati 24, Ohio.**

ONARGA MILITARY SCHOOL

Individual College Preparation. Fully Accredited. Teaches How to Study. Daily tutoring. Business Courses. Vocational Guidance. Character first! 9th gr. up. Gym and pool. 95 miles S. of Chicago. Catalog. **Col. L. W. Bittinger, Box W, Onarga, Illinois.**



EDUCATIONAL TROUBLE SHOOTERS

Individualized Plan—Each Student a Class

For those with educational problems—successful college preparation and general education. **Our tests discover causes of difficulties** and we (1) devise individualized program to overcome difficulties; (2) make up lost time; (3) install confidence; (4) teach effective study skills; (5) develop ability to concentrate, speeds of study. *Faculty 10; Enrollment 80; 40 years' experience.* Write Edward E. Knight, Ph.D., Headmaster.

OXFORD ACADEMY

Box G-93, Pleasantville, N. J.

PEACOCK MILITARY ACADEMY

A Distinctive School since 1908. All-round development. Fully accredited. Ages 12 to 19. Limited enrollment. Cavalry and Infantry. Address the **Superintendent, 204 Peacock Ave., Woodlawn Lake, San Antonio 1, Texas.**

PEDDIE

An endowed school. Boys thoroughly prepared for college and for life. Fully accredited. Jr. School. Small classes, individual guidance. Public speaking course required. Sports. Two gyms, golf, pools. 300 acres. Summer session. 45 miles NYC. 68th year. Catalog. **C. O. Mersereau, Th.D., Box 6-N, Hightstown, New Jersey.**

Peekskill MILITARY ACADEMY

A school of tradition and academic accomplishment. Fully accredited and strictly non-profit. 116 years service to the nation. Military of highest Gov't rating. Small classes. Full athletic program for all. Modern bldgs. Swimming pool. Jr. Sch. 9th grade up. 40 miles from N. Y. Phone 7-0281. Catalog. **HEADMASTER, BOX 306, PEEKSKILL, N. Y.**

THE PENNINGTON SCHOOL

FOR BOYS—Accredited College Prep and Jr. Sch. 7th Grade up. Small classes with daily help of friendly Masters. Remedial reading. Music, crafts. All sports, gym, pool. Near Princeton. 175th yr. Catalog. **J. R. Crompton, D.D., Box N, Pennington, N. J.**

PENNSYLVANIA MILITARY PREPARATORY

FULLY accredited college prep. Small classes. Guidance program. ROTC. Highest Government rating. Varsity and intramural sports. Swimming. Band. 129th year. For Catalog, write **C. R. Mull, Dept. 5, Chester, Pennsylvania.**

BOYS TAUGHT HOW TO STUDY

Perkiomen

Starts his college preparation in this home school where his own remedial program will progress his interest and accomplish maximum results to shorten time then frequent qualifying tests.

Grades 7-12. All sports, varsity & intramural; every boy on a team. Country location convenient to N. Y. & Phila. Fully accredited. Founded 1875. Summer Session. Send for Catalogs.

Albert S. Rogers, Headmaster, Pennsburg, Pa. (near Quakertown)

RANDOLPH-MACON ACADEMY MILITARY ACCREDITED 58th Year

PREPARES for college through intensive study methods. At northern entrance to Skyline Drive. Fireproof buildings. Superior equipment. All athletics. Gymnasium, swimming pool, band. For catalog and "Your Boy" folder address **Colonel John C. Boggs, Principal, Box E, Front Royal, Virginia.**

RANSOM SCHOOL

FORMERLY Adirondack-Florida. Est. 1933. Full school year on Biscayne Bay, Florida. Prepares boys 12-19 for all colleges. Strict emphasis on scholastic attainment. Sports. **D. Pierre G. Cameron, Coconut Grove, Miami 33, Florida.**

RIVERSIDE

Health and interest assured by Spring and Fall in Georgia mountains, Winter at Hollywood-by-the-Sea, Florida—two complete school plants.

Fully accredited preparation all colleges. Also Post Graduate department. Separate School younger boys. Constant association with selected faculty who live and eat with cadets. Weekly reports. Highest official Army rating. Progress GUARANTEED. Moderate rate (no extras).

For illustrated catalog, address

GENERAL SANDY BEAVER, President

WINTER NEAR MIAMI Box 108-N, Gainesville, Ga.
FALL & SPRING IN BLUE RIDGE MOUNTAINS

ROOSEVELT MILITARY ACADEMY

"Builder of Men." An outstanding educational institution. Small classes. Daily tutoring. Fully Accredited. Guidance Dept. Grades 5-12. All sports; Band; Riding. Moderate rate. Catalog. **Col. Glen G. Milliken, Box N, Aledo, Ill.**

ST. JOHN'S MILITARY

ACCREDITED college prep in heart of Wisconsin's land o' lakes. Grades 7-12. Balanced program. Excellent faculty. Riding, golf, sailing. Winter sports. Flying. Summer session. 46th year. Catalog. **1360 DeKoven Hall, Delafield, Wisconsin.**

SAINT THOMAS MILITARY ACADEMY

MILITARY training combined with superior college preparation in Catholic environment. Guidance. Pool, gym, sports. R.O.T.C. Boarding, day. Catalog. **Very Rev. V. J. Flynn, Box 2, St. Paul 1, Minn.**

SEVERN SCHOOL

THOROUGH preparation for colleges, technical schools, and Service Academies. Grades 9-12. Small classes insure individual attention. Accredited. Athletics. Near Annapolis on Severn River. Limited enrollment. 37th year. Catalog. **Rolland M. Teel, Box 106, Severna Park, Md.**

SHATTUCK SCHOOL

Boys. Grades 9-12. College preparation and general education. Small classes. MILITARY. Sports for all. Choir. Band. Social program. Summer school-camp. Founded 1858. Episcopal. Write **Rev. Sidney W. Goldsmith, 505 Shumway Hall, Faribault, Minnesota.**

STAUNTON MILITARY ACADEMY

- ★ Distinguished academic record. Successfully prepares for college.
- ★ Fully accredited. Business courses available. Thorough military training develops poise, self-reliance. ROTC unit. Army's highest rating. Complete athletic program.
- ★ Superior health record. Separate Jr. School 6th to 8th grades. Catalog: Supt., Box D-6, Staunton, Va.

STORM KING

ACCREDITED. Grades 8-12. Individual instruction. Graduates in leading colleges. Beautiful 20-acre campus on Hudson, near West Point. 16 buildings, gym. Sports; varied activities. Est. 1867. Catalog. **Anson Barker, Headm., Box N, Cornwall, N. Y.**

TENNESSEE MILITARY INSTITUTE

One of America's really good schools. Grades 8-12. Over 90% of graduates enter colleges. Small, friendly classes. High scholastic standards. All sports, incl. golf. ROTC. 77th year. Catalog. **Col. C. R. Endsley, Box 147, Sweetwater, Tenn.**

THOMAS JEFFERSON SCHOOL

TEACHES practical democracy. Limited to 80 boys bombed for college. Beautiful suburban campus. Faculty hold degrees from Harvard, Yale, Cambridge. Sports. Non-profit. Accredited. Catalog. **Robin N. McCoy, M.A., St. Louis 23, Missouri.**

TILTON SCHOOL

COLLEGE preparatory for boys. Fully accredited. Math., languages, sciences. All sports. Moderate rate. Also Lower School—grades 7 and 8. 1 hour N. E. to N.Y.C., Boston. Est. 1845. Catalog (specify Upper School or Lower School). **Dr. James E. Coons, Box E, Tilton, New Hampshire.**

TODD SCHOOL AND CAMP

Boys 9 to 20. 102nd year. Accredited individual College Preparation. Study help. Creative Activities from Shop to Journalism. Friendly environment. Riding. Hour from Chicago. Catalog. **Roger Hill, Prin., Box G, Woodstock, Illinois.**

"At the Nation's Shrine"

VALLEY FORGE Military Academy

Your boy trained for responsible leadership. Graduates in over 100 colleges and to government academies. Personal instruction by faculty of specialists. College preparatory and Junior College, ages 11-20. Reading and Speech Clinics. All varsity sports. Thirty-two modern fireproof buildings, including two gymnasiums. Motorized Field Artillery, Cavalry, Infantry, Band and Senior ROTC. Catalog.

Box M, Wayne, Pa.

WAYLAND ACADEMY

PREPARES boys and girls for all colleges, universities. Small classes, supervised study. Religious, home atmosphere. Music, dramatics. Commercial dept. Athletics. New gym, pool. Dorms. Grades 8 to 12. 95th yr. **Weimer K. Hicks, President, Box 73, Beaver Dam, Wis.**

WENTWORTH MILITARY ACADEMY

81st yr. Jr.-Sr. High School. Separate 2-year College. Senior ROTC. CAA Flying. All accredited. Heart of America. Large Gym. Indoor pool. All Sports. Riding. Mathematically Correct Class. Summer School. Catalog. **Col. J. M. Sellers, 860 Wash. Place, Lexington, Mo.**

WESTERN MILITARY ACADEMY

FACULTY accepts responsibility for academic success, inspires self-confidence, awakens interest. Prepares for all colleges. Grades 8-12. Athletics, social program. Riding. Indoor pool. 72nd yr. Catalog. **Col. R. L. Jackson, Box N-8, Alton, Illinois.**

WILLISTON ACADEMY

UNEQUALED educational opportunities for boys at modest cost. Endowment over half a million. Graduates regularly accepted by all eastern colleges. Modern gymnasium, swimming pool. Separate Junior School. **Phillips Stevens, Headmaster, Box 21, Easthampton, Mass.**

WORCESTER ACADEMY

INTERNATIONALLY-known preparatory school for boys. Est. 1834. 85% of graduates entered college in 1951. Gym, swimming pool, theatre. For catalog address **Leroy A. Campbell, Ph.D., Headmaster, 99 Providence Street, Worcester 4, Mass.**

PLEASE FILL IN BLANK BELOW, DETACH, AND MAIL TO THE SECRETARY

Recommendation for Membership

IN THE

NATIONAL GEOGRAPHIC SOCIETY

** The Membership Dues, Which Are for the Calendar Year, Include Subscription to the National Geographic Magazine*

To the Secretary, National Geographic Society,
Sixteenth and M Streets Northwest, Washington 6, D. C.: _____ *1950*

I nominate _____
PRINT NAME OF NOMINEE

Occupation _____
(This information is important for the records)

Address _____
PRINT ADDRESS OF NOMINEE

_____ *for membership in The Society.*

Name of nominating member _____
PLEASE PRINT

Address _____

* DUES: Annual membership in United States, $4.00; Canada, $5.00; abroad, $5.00. Life Membership, $100.00 U. S. funds. Remittances should be payable to National Geographic Society. Remittances from outside of continental United States and Canada should be made by New York draft or international money order.
6-50

A sturdy tree…let's keep it healthy

The Bell System is one of the great businesses of this country and a part of the prosperity of the whole country.

It provides the best telephone service in the world, and the price is low. It buys widely in many markets. It employs over 550,000 men and women and its annual payroll is above $2,000,000,000 — more than three times as much as in 1940.

Helps Business Generally — These things are all good for business, and for the people business employs. The wages spent by telephone employees mean jobs and wages for people in many other lines. So do the large purchases of Bell Telephone Companies themselves.

Western Electric, the manufacturing, purchasing and supply unit of the Bell System, alone bought from 23,000 different concerns in 2500 cities and towns last year.

From Little Acorns — The Bell System is a sturdy oak that has grown from the little acorns which are the savings of many hundreds of thousands of men and women in all walks of life. It is the money these people invest in the telephone system that provides the capital for new facilities to improve and expand the service.

The Roots of the Matter are rates and earnings that are adequate to meet today's increased costs and attract new capital. For only if rates and earnings are adequate can we give you telephone service that gets better year after year, and that grows and expands to meet your constantly increasing use.

BELL TELEPHONE SYSTEM

1. **In all the world,** one gift thrills everybody—Dad on Father's Day, a boy or girl at Graduation, or a new bride. And that one gift's a fine watch. Your jeweler can show you many new styles for yourself or the owner-to-be. And remember—above all—*it's the movement that counts—be sure the watch you buy has a quality Swiss jeweled-lever movement.*

The gift most people want . . .

2. **See new Swiss** water-, shock-resistant, self-winding, calendar watches, chronometers, chronographs. Ask your jeweler to show you *the best jeweled-lever Swiss watches in your price range.*

3. **Jewel-mounted** balance wheel (left) has adjusting screws that give true balance and accuracy cheap movement never has. *Don't be fooled by "bargains"—you usually get what you pay for.*

4. **A Swiss designed** one of the first self-winding watches for Marie Antoinette. Another created one of the world's tiniest, for a modern princess. And Swiss chronometers time Olympic games.

5. **Look for** this symbol of the Swiss Watch Repair Parts Program at your jeweler's. It means your watch can be serviced economically, promptly, if it has a quality Swiss jeweled-lever movement.

For the gifts you'll give with pride—let your jeweler be your guide

The WATCHMAKERS OF SWITZERLAND