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4-H Boys and Girls Grow More Food

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25 Natural Color Photographs

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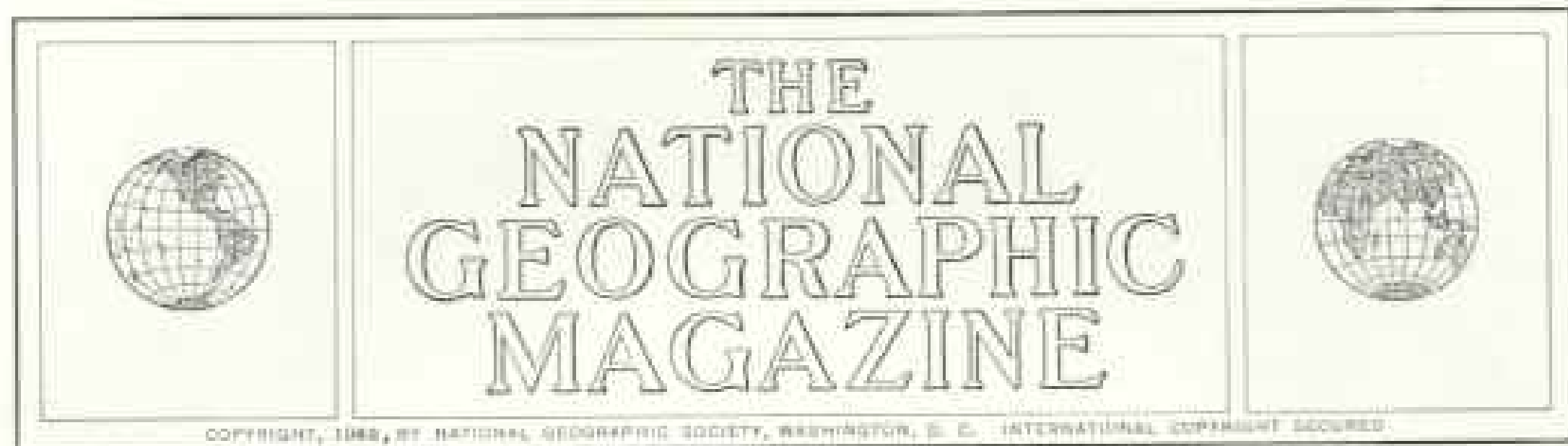
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4-H Boys and Girls Grow More Food

BY FREDERICK SIMPICH

FROM her wheelbarrow she took some boards, a saw, hammer, and sack of nails. "This is how a 15-year-old 4-H girl makes a pig trough," she said. And then, before a crowd of farmers at Maryland State Fair, in Timonium, she sawed and pounded and built that trough, and poured in water to prove it wouldn't leak.

"A pig is half water," she explained, "but his stomach is little; so he must drink often" (page 574).

Carrying live rats in a cage, a gas squirt gun, and a can of poison, two boys followed the pig-trough girl. They showed how to rid a barn of rats and mice (page 567).

Then a girl of 16 lectured on grass, silage, and haymaking. Pots set before her held clover, alfalfa, and lespedeza. She told how many acres of any grass it may take to graze a cow, or how much of certain feeds it takes to make a gallon of milk.

Talking on "Care of Sheep," a farm boy wrestled a kicking lamb and showed how to judge it for shape and wool texture. "And don't ever let your lamb get at green apples," he warned. "They give him stomach fuss, or make him shoot his cookies. And watch his feet in muddy times." With a pair of pruning shears he showed how to trim a sheep's hoofs.

Visiting Eastern States Exposition at Springfield, Massachusetts, I lunched at a party with a 4-H boy and girl as host and hostess. Girls had cooked the lunch from meats, fruits, vegetables, milk, eggs, and butter all furnished by Club workers.

Across America, as I write, thousands of other farm boys and girls are guests at county and State fairs, at livestock shows in Denver, Kansas City, Chicago, Texas. You see them carefully combing their calves, dusting off prize pigs, polishing the horns and hoofs of

cattle, or braiding the manes and tails of giant Percheron and Clydesdale horses (pages 556, 571, 573).

Others show how to repair a tractor and "keep its nose clean" or to care for plows, potato diggers, and other farm machinery, while on long tables in countless exhibit halls girl students of home economics display their vegetables, canned fruits, cakes, and salads, or clothing they have made (pages 559, 563, 576).

4-H Clubs Have Trained 14,000,000

Since the Children's Crusade set out to free Jerusalem from infidels, our world has seen many youth movements. But nothing like this 4-H work. These Clubs number 1,759,911 active members and to date have trained some 14,000,000 American youngsters.

"Father and Mother met at a 4-H camp, when they were members; now my sister and I belong," said a Maryland boy. Over and over, I met these second-generation members.

By Act of Congress this youth training is placed under the United States Department of Agriculture, land grant colleges' extension services, and the 6,534 county agents in all the States. Across the land are 80,286 4-H Clubs and 203,211 volunteer country men and women who serve without pay as local Club leaders (page 576).

Aid comes, too, from a long list of corporations and individual donors. They give awards ranging from scholarships, breeding stock, and farm implements to gold medals, cash prizes, and free trips to fairs and national 4-H conventions.

"There is no movement of greater value to our country," says Mr. Fowler McCormick, Chairman of the Board of International Harvester Company.



John H. Jeter, The Dallas Morning News

This Texas Tom Sawyer, a Grand Slam Winner, Has Lost a Tooth but Not His Smile

Oliver Davis of Carrollton, an exhibitor at the Dallas County Fair, won first, second, and third prizes for the best squash, which he raised all by himself. This seven-year-old is counting the years (three) until he is eligible to join the 4-H. He can then be a Future Farmer of America, also, if he chooses.

As early as 1931 Harvester gave 100 scholarships to aid farm boys and girls. In 1947, to gain higher yields of food, feed, and fiber crops through wiser farm methods, better seed, and best use of farm machinery, it gave increased aid to boys from 44 States in field crop contests and to girls in 42 States in frozen food contests.

In the same way, such giants as General Motors, Servel, Inc., Westinghouse Educational Foundation, American Viscose Corporation, Kraft Foods Company, General Foods Corporation, General Mills, Inc.; the Burlington, Baltimore and Ohio, Union Pacific, and Illinois Central railroad systems; Firestone, Allis-Chalmers, Kerr Glass Manufacturing Corporation, John Morrell & Co., the Standard Oil Company in various States, and others give awards to aid this work.

"No movement in modern education has so captured the imagination and heart of the American people," says Paul E. Miller, Director of Agricultural Extension at the University of Minnesota. "In our State more than 500,000 boys and girls between 10 and 21 have benefited by the 4-H 'Learn by Doing' program."

4-H's—Head, Heart, Hands, Health

When a boy or girl joins a Club, he makes this pledge:

I PLEDGE

My head to clearer thinking,
My heart to greater loyalty,
My hands to larger service,
My health to better living,
For my club, my community, and my country.



Jack Britton, *The Des Moines Register & Tribune*

Lord Inverchapel Appraises a Fat Ear of Iowa Corn

When Roger Newburn (right), of Eagle Grove, invited the British Ambassador to "come out and see how we grow corn," His Excellency went. "They treated me like one of the family," Inverchapel told the author. "I did my share of the chores; I came to like this fine, wholesome farm family so much that later it was my pleasure to entertain them at the Embassy in Washington." Lord Inverchapel recently retired to his ancestral farm in Scotland (page 568).

The name "4-H" comes, then, from Head, Heart, Hands, and Health, and the symbol is a four-leaf clover, with an "H" on each leaf.

When a member joins, he chooses one or more projects for his training job. Girls go in for baking, canning, sewing, or home furnishing. A boy—or girl—may raise a garden, a field crop, or start with a calf, pig, or lamb, or a flock of poultry. From such simple starts with one calf, scores of youngsters have built up and come to own prize purebred herds worth snug fortunes (pages 565, 575, 580, 581).

Still others go in for forestry, dairying, soil



Chicago Tribune

England Congratulates Oklahoma on the Glossy Look of a Grand Champion

Richard de Quincey of Bodenham, Hereford, England, who was a judge at Chicago's International Live Stock Exposition last year, shakes hands with Claude Millwee of Fort Cobb, Oklahoma. De Quincey named Big Boy, Millwee's 1,100-pound Shorthorn steer, the junior grand champion.

conservation, wildlife protection, and many other activities.

Leaders aid youths to stick to allotted tasks, think straight, speak in public, and enter prize-winning contests. For nearly 20 years Maine has led all other States in percentage of 4-H members who complete the year's projects.

At State fairs today 4-H work is a top farm exhibit. On the Minnesota State Fair Grounds, as in several other States, 4-H'ers have their own magnificent exhibit building.

"Win Without Bragging, Lose Without Squealing"

At some contests prize animals often sell for dizzy prices. An Iowa boy's 1,212½-pound grand champion steer sold at an American Royal Live Stock & Horse Show in Kansas

City, Missouri, for \$35.50 a pound—enough cash to buy a whole farm in Iowa, whose State 4-H motto is "to win without bragging—to lose without squealing."

Often such high prices are paid by a fancy stock farm, by a well-known restaurant just for publicity, or by the winner's friends to help him or her along.

"But we don't think that's wise," says Russell Thorp, of the Wyoming Stock Growers Association. "Such inflated prices give the farm boy a wrong idea of how much money he can make later in the cow business."

One Cornell instructor says the "stimulation credited to cash awards is much overrated. A greater stimulus, in our opinion, stems from the desire of the individual to excel in his achievements."



National Geographic Photographer Richard H. Stewart

A Whip Dangled Before the Eyes Freezes the Horse in a Proud Pose

Boy and girl teamed in this Maryland 4-H Club drew numbers to see whose horse should be exhibited at the State Fair, Timonium. At times a girl of not more than 12 years may lead in a 2,000-pound animal.

There's no attempt at Cornell to develop a purely rural society, its instructors point out. All farm-bred youth can't stay on the land. There isn't land enough nor are all country-born boys and girls interested in farming as a life work.

Yet this training enables American youth to explore and study farming as a profession and to apply scientific information to daily farm and home jobs. It also gives those who may not wish to plow and plant a wider basis for decision.

"Do you want to marry a farm boy?" I asked many farm girls. Some giggled, some looked thoughtful and said, "Why not?"

"While our 4-H program is not designed for matchmaking," says Extension Editor Earl C. Richardson, of Michigan State College, at East Lansing, "contact between boys and girls

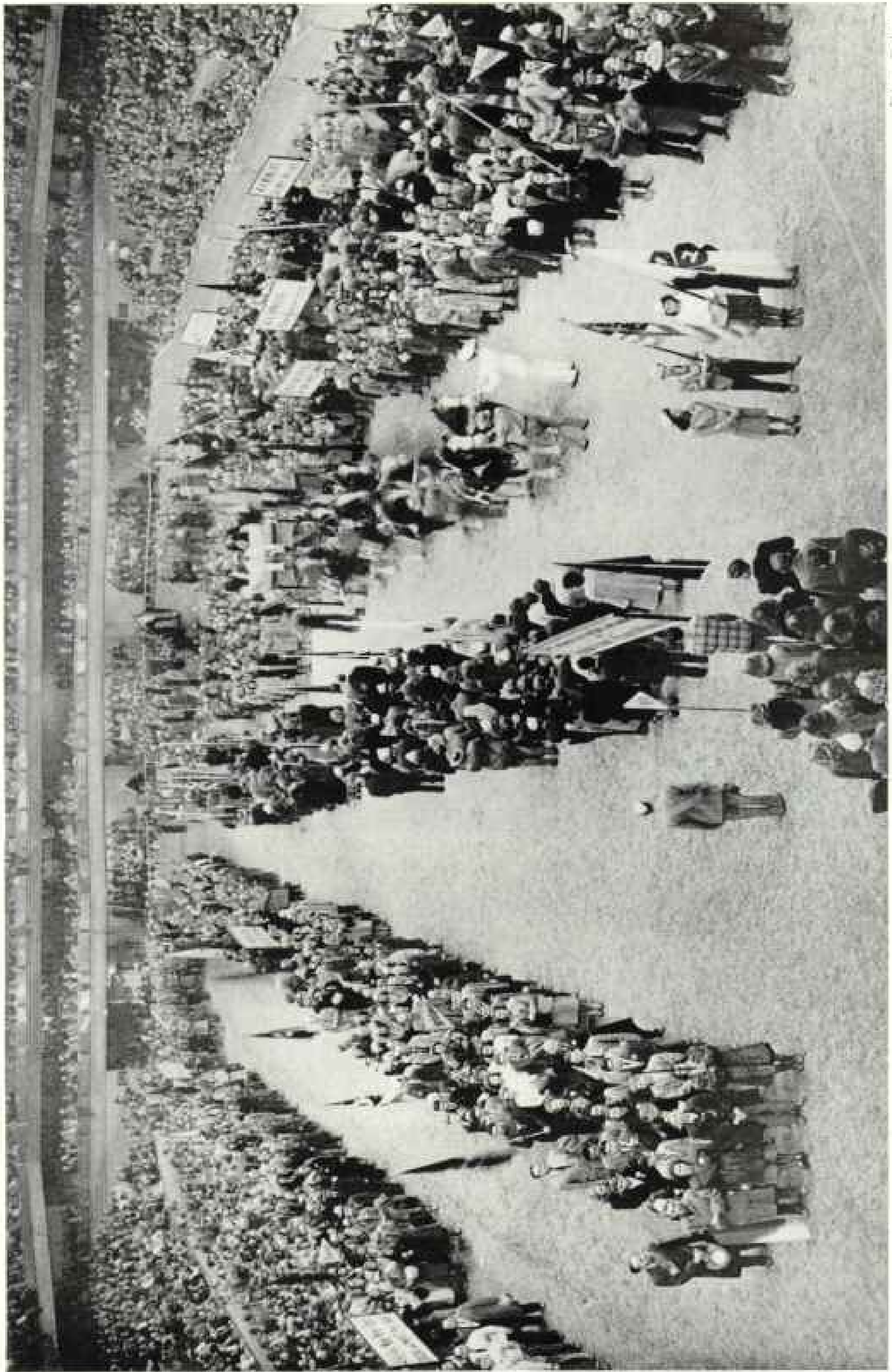
in Club work does make for matrimony. Their interests are the same. If the farm girl really loves the farm and wants to make a career of farm homemaking, she has a good chance to look over young farmers who show tendencies toward success."

Georgians "Dedicate the Plow"

In Druid Hills Baptist Church at Atlanta, Georgia, a "Dedication of the Plow" ceremony is held each year on "4-H Sunday."

From 4-H work Georgia sees good results in better fences, homes, barns, and cropping systems; during World War II its youth raised over \$21,000,000 worth of food and sold over \$34,000,000 worth of bonds.

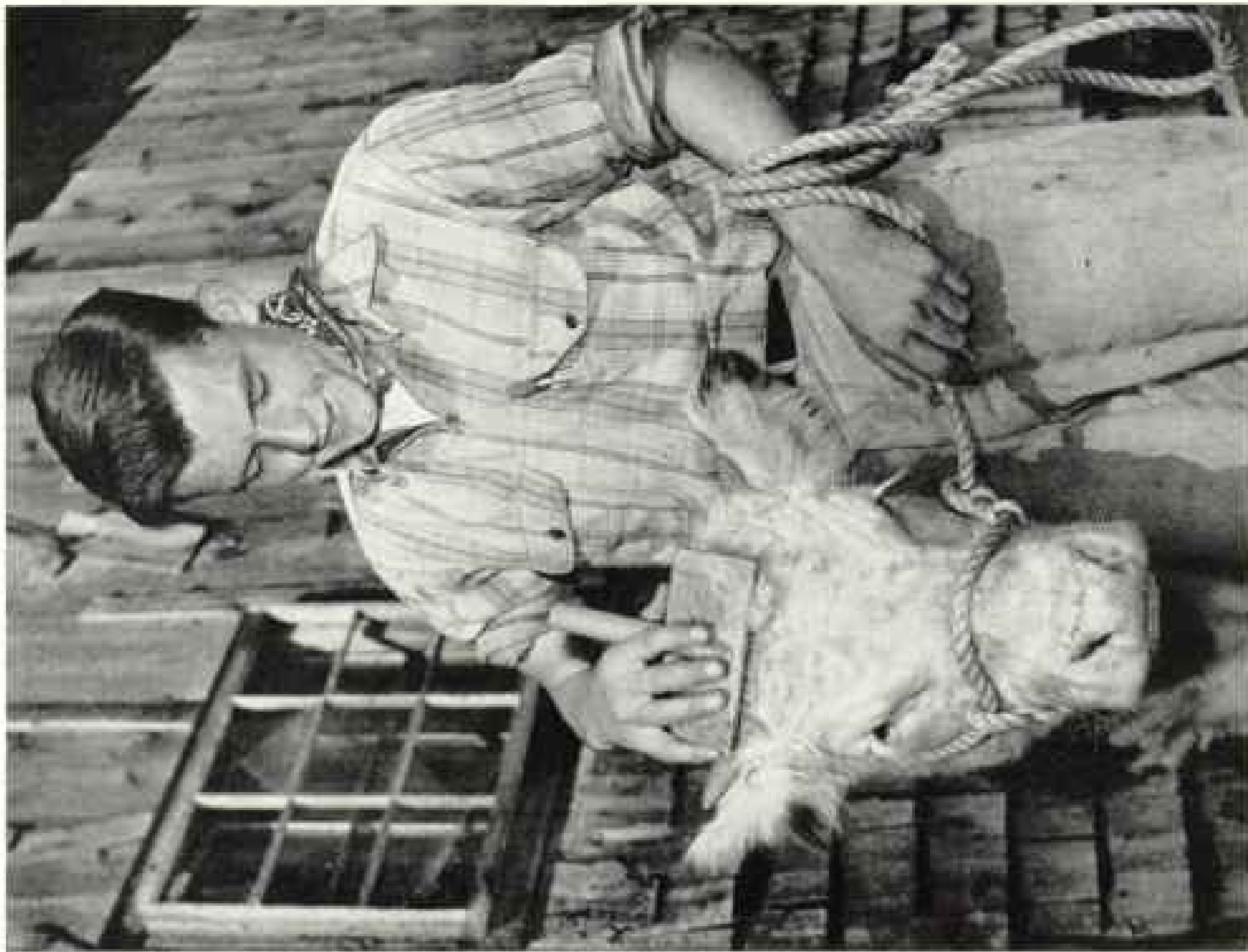
Since all farm youth can't stay on farms, Georgia seeks to train its boys and girls to make good citizens and to love their work, no



Chicago Tribune

Prize-winning Delegates to the National 4-H Club Congress Parade at the International Live Stock Exposition, Chicago

Led by a 4-H brass band (not shown), hundreds of boys and girls from all parts of the Nation line up before a huge audience. Posters carried by various groups boast of the number of animals grown and the increase in members' bank accounts. Top winners ride the horse-drawn wagon (page 573).



Does a Calf Enjoy a Dry Shampoo? The Smile Says "Yes"

With speed and strength, J. Gilman Allard of Bolsters Mills, Maine, captured this four-month-old Hereford in a "calf scramble" at Fryeburg Fair. First to grab and halter the calf, he became its owner (page 370).



National Geographic Photographer Robert F. Stamm

Althea Looks at the Girl Who Built Her Dressing Table

Miss Chapman, who lives in Portland, Maine, has spent six of her 16 years in 4-H work. "I love it," says she. "One objective is to make your own home a happier, more convenient place to live."

matter what occupations they finally choose. And they do!

The late Gen. George S. Patton, Jr., gave me a ride in one of his tanks, driven by a Georgia farm boy who nearly broke my neck as he rolled his tank down a steep bluff!

"Georgia farm boys make bully tank drivers," said Patton, "from so much previous wrestling with farm tractors."

From the Farm to Varied Fields

Before me lie some 75 letters from Schools of Agriculture, successful men and women and editors of farm papers, who once had 4-H training. Every one repeats the story of 4-H achievement in growing more meat, wheat, and potatoes, and cites stirring cases of former 4-H boys now leading busy lives at good work in cities.

Go into any packing plant, big cannery, or factory that processes food; talk to wrinkle-suited men who hurry across country in dusty Fords, buying for the wholesale poultry, provision, and fruit firms or the chain stores, and see how many are former 4-H boys. They learned how, on the farm, raising food.

Big food firms in Kansas City, Omaha, St. Louis, Chicago, Atlanta, all like to hire 4-H-trained farm boys.

Girls, too. The manager of a giant mail-order store in Springfield, Massachusetts, had 4-H training. So did a comparison shopper for a great Chicago store.

One country girl I met travels all over America as a stylist. She visits 4-H Club meetings where girls are showing the dresses they've made and tells them about new patterns made by the firm she represents.

"Where does style originate?" I asked her.

"Nobody knows," she said. "Paris says *here*. New York echoes; so does Hollywood and even Dallas, Texas.

"Anyway, I know several 4-H girls who've designed striking costumes. One shot a mole, skinned it and made a fur coat for her doll! One shot a deer and used the hide for her handbag.

"Some hope to land on Fifth Avenue as professionals like Hattie Carnegie or Madame Schiaparelli. Maybe they will! After all, Levi overalls and fancy cowboy shirts originated on our western dude ranches. Why not an Oklahoma Indian handbag, or a skirt with buckskin fringe from Cheyenne?"

The Illinois Central Railroad lately sent out a special train through Louisiana and Mississippi loaded with 4-H girls and boys and with their exhibits of livestock, poultry, sugar cane, shrimp, and sweet potatoes. Four-H home economics exhibits were there too. One of the

directors of the railroad, Thomas E. Wilson, Chairman of the Board of Wilson & Co., Inc., went along part of the way with them.

That train, all painted up with 4-H symbols, stopped at 79 towns in the two States to acquaint people with what 4-H is doing. It was like a circus. Thousands of visitors swarmed through the cars.

Another railroad with a distinct 4-H policy is the Burlington, whose west-bound rails were laid through virgin territory *ahead* of agriculture.

When 4-H'ers came along, sons of pioneer settlers, Burlington helped them. It granted cash to counties in its territory which would hire county agents able to teach Club members; it set up experimental farms, ran educational trains, and helped introduce new crops.

Preserving the National Heritage

Soil erosion control is a steady job for farm boys. From Utah, Idaho, Kentucky, Wyoming, Indiana, and some 35 other States come reports of boys who have ditched, terraced, laid drainpipes, seeded old fields to grass, filled up gullies, and built ponds and dams. They have a jingle, author unknown, which runs:

Hordes of gullies now remind us
We should build our lands to stay
And, departing, leave behind us
Fields that have not washed away.

When our boys assume the mortgage
On the land that's had our toil,
They'll not have to ask the question:
"Here's the farm, but where's the soil?"

Close to 2,550,000 boys and girls, members of 4-H Clubs, have been trained in conservation work, ranging from halting erosion to feeding quail (page 578).

There's no joy in living on a farm where no flower beds bloom, no bird song is heard, no rabbits romp in the thickets, no squirrels scold from green treetops, and no wild ducks glide in at dusk to roost on your pond.

Wildlife doesn't harm good farming. In conservation camps boys and girls learn, for example, that some hawks, gulls, foxes, and even snakes do more good than harm.

Sure, birds eat your fruit and berries; but they also eat the insect pests. Some small birds each day eat insects and weed seeds equal to their own weight. Owls catch chickens; but also one pair of owls, under scientific study, ate 1,000 field mice in six months!

How to protect wildlife, then, is one of the main courses taught at these 4-H camps. Soil, water, trees, gardens, and field crops all

4-H CLUB CANNING 5



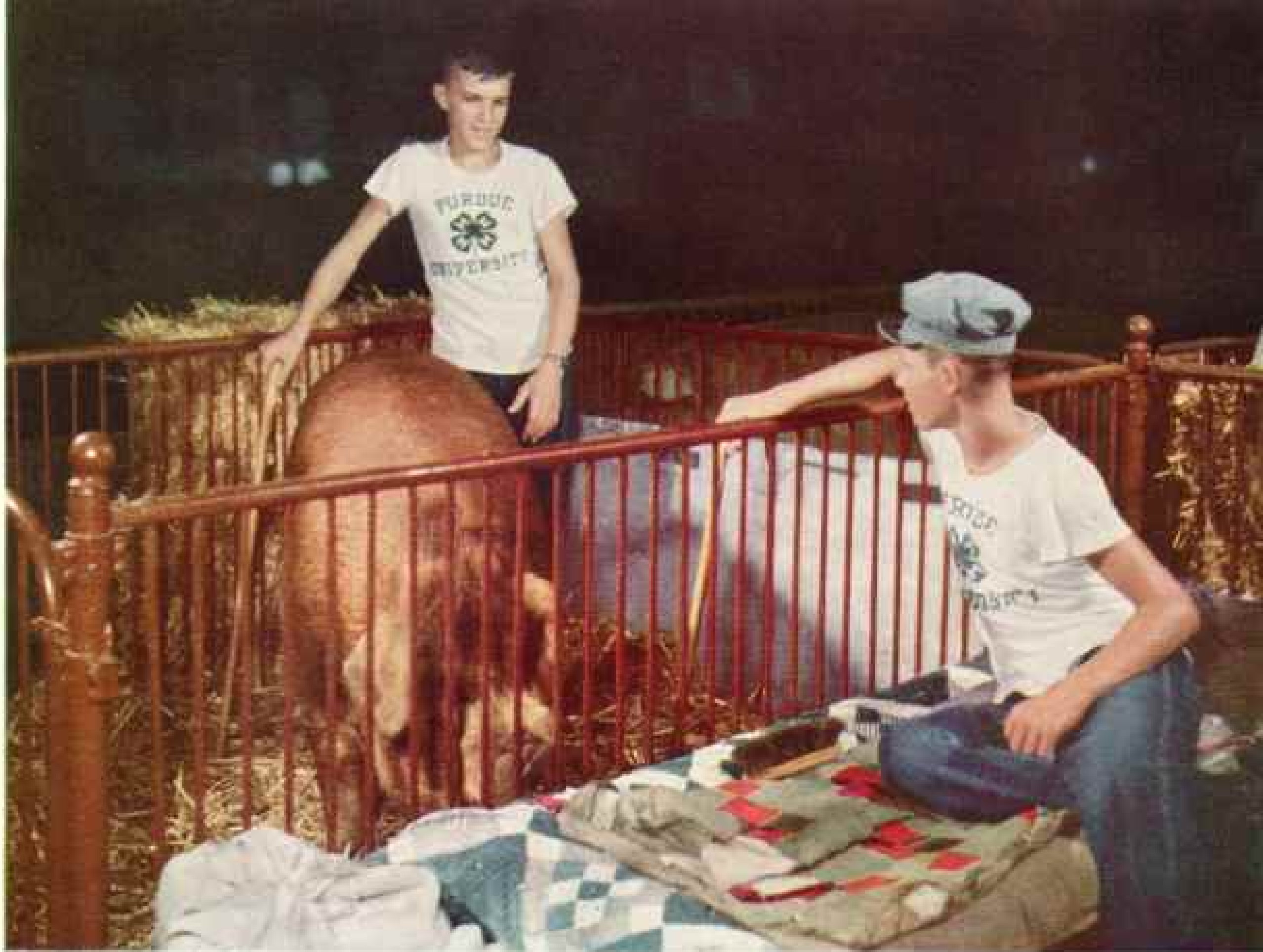
A 4-H Beauty Presents a 4-H Feast for Hoosier Eyes at State Fair, Indianapolis

Some 1,760,000 American boys and girls in 80,000 4-H Clubs learn to be scientific farmers and good citizens. To help win the war, club members canned 74,000,000 quarts of food.



Georgia's Goddess of Light Points Her Wand at Edison's Magic Lamp

Farm's candles and kerosene lamps are going out like city gaslights. Electricity performs chores for two-thirds the Nation's farmers. Rhonwyn Lowry, a 4-H exemplar, illustrates.



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Illustrations by J. Bayler Roberts

♣ **Sleeping Beside Pigs May Not Be Elegant, but It Pays Off in Prizes**

Judging started so early that Warren Huntzinger (right) spent the night on the cot. At 5 a. m. he and Reece Rogers groomed the 600-pound Duroc boar for the Indianapolis show.

♣ **Mary's Little Lamb Grows Up To Be Jeannette's Champion Hampshire**

Miss Woebeking, nine years a 4-H member, holds her trophy at Indiana State Fair, while her entry poses like a statue. She has taken part in 25 4-H work projects.





Husking Bee and 4-H Romance Are Fruits of the Harvest Moon at University of Massachusetts, at Amherst

Miss 4-H Sews a Button; Maybe She'll Become a Stylist

Barbara Beckwith, a University of Connecticut sophomore, wears her own creation, a smart woolen dress. Many 4-H girls make their own clothes. Such training may lead to careers with big fashion designers.

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Miss Vermont Says, "I Can," and Puts Up 500 Jars a Year

In 1947, 265,000 girls—and boys—took part in 4-H canning projects. Jacqueline LaVigne specializes in tomatoes from her own Essex Center garden. She has performed 4-H tasks for seven of her sixteen years.

Illustration by Robert F. Sisson





Auctioneer's Lungs and Arms Explode; a Sirloin Fortune Goes to the Highest Bidder at Fryeburg, Maine.

The Loving Care Spent on Pets Nets Substantial Cash Returns

To become a member of the 4-H, any boy or girl between the ages of 10 and 21 may enroll with his county extension agent. It takes five or more youngsters in a community to form a Club under a leader.

For individual work projects, more than 30 subjects are available. These include poultry, soil conservation, food preparation, and wood-working. Each project develops a valuable skill.

Boys and girls of the 4-H have been described as the finest crop of the American farm. "Make the best better" is their motto (page 560).

On the left, 13-year-old June Matthews takes care of her chicks at Fall City, Washington. She helped her father build the hen house; now she performs all the poultry chores. As a reward, she cleared \$150 in 1947.

In Webster, New Hampshire, the Phelps sisters groom their Holstein heifer for the show ring. They are Pat, 19 years old, and Henrietta, 12. Downcrest Modest Beauty enjoys the pedicure.

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←Kubrickama by John E. Pletcher

Kubrickama by Robert F. Allen →





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Illustrations by Robert F. Brown

✦ **Slicing Carrots for Her Own Deep Freeze**

Mildred Scher of Westfield, Massachusetts, has packaged 300 boxes of fruits, vegetables, and meat.

✦ **Junior Bakers Tackle Flour and Recipes**

Peter Berry and Tom Dyer of Bridgton, Maine, eat their own 4-H cooking. Tom aims to be a chef.



tie in. Clubs learn to dig fishponds and drainage ditches, plow fields in terraces, stop gullies with dams, rotate crops, use fertilizer, plant trees, and put out forest fires, or to leave bits of crops unharvested or a fence row uncleared or unburned as cover, food, and protection for small wild animals and upland game birds.

FBI Says 4-H Strengthens Democratic Society

Dean H. J. Reed of Purdue's School of Agriculture, at La Fayette, Indiana, says more than half the young men enrolled there in agriculture are former 4-H members.

Indiana, too, stresses the value of moral training. Writes Mr. Reed: "One of our juvenile court judges says in all his experience he has never had a boy or girl in his court who has been in 4-H Club work."

On this point comes a letter from Director J. Edgar Hoover of the FBI:

"I am deeply grateful for the opportunity to make a contribution to your NATIONAL GEOGRAPHIC story on the work of 4-H Clubs. The spirit of hard work, honest living, and fair play instilled in youth through this training is a material factor in our national well-being, and strengthens immeasurably our democratic society."

The art of using words to convey truth and rouse emotions is taught as part of this work. At Club meetings I heard quick-witted country boys and girls of 18 to 20 debate such tough themes as "Is it immoral to use atomic bombs in war?" and "What should we do about Greece?"

That cynical old saying that youth is too fine a thing to waste on young people is all upset when you see these 4-H'ers in action.

Achievements vary widely. Vincent J. Rauth, of York County, Nebraska, won a \$4,000 scholarship in a model car competition offered by an automobile craftsmen's guild and is now at Notre Dame. An Idaho boy, working in forestry, won a scholarship at Harvard. Peggy Sample, of Rutherford, Tennessee, won a prize for suggesting a name for a pedigreed calf. She sent in that name without telling anybody; imagine her family's excitement when a check came to her for \$100!

Models Made from Nature

I watched one 17-year-old Maryland girl working at ceramics. From a lump of clay she shaped a frog and glazed it.

"Now I bake it three hours in this electric kiln, and there's your salable piece of ceramics," she said to an attentive class of some

90 girls. "This past winter, while in high school, I made and sold lapel pins, book ends, ash trays, and other pieces."

"Where do you get your patterns?"

"For this," she said, "I just caught a frog. If I want to make a plant design, I go out and pick a pretty leaf or maybe a flower."

Since all work and no play makes Jack dull, summer camps all over America bring fun and recreation to thousands of 4-H boys and girls. Some camp sites and buildings, usually in the State parks, are owned by the States and often by individual Clubs that have bought sites and built lodges or received them as gifts from private donors. We visited several.

Adult leaders and chaperons—and motherly cooks—run the camps. Daily doings range from dancing, rifle shooting, group games, bird hikes, forestry, and botanizing to group singing and lessons in archery and swimming.

I watched one young lady, now director of physical education in a southern college but herself a former 4-H member, teaching youngsters to swim. Few had been in a pool before.

"What's hardest about your job?" I asked.

"Conquering their fear," she said. "First I make 'em float. I say lie down, as if you were on the bed, flat on your back, and spread out your arms and legs. Put your head back and breathe—and stick your stomach out! Mamma's always telling you to pull your stomach *in*: I say stick it *out*—that's how to float!"

In three days she had that whole crowd of landlubbers swimming like ducks, unafraid.

All across America this great, growing youth army mixes work with play. It agrees that healthy boys and girls are a finer farm crop than pigs and calves. Hence, as it sows and reaps it also sings, dances, and debates—and finds "sermons in stones" and "books in the running brooks."

In the Tradition of Daniel Boone

How many city girls could catch and dress a chicken? How many city boys could trap a mink or skin a skunk?

Born close to the woods and wildlife, most country boys are just naturally part Daniel Boone at heart. On farms from Michigan to Texas, on autumn or winter evenings after the milking is done and livestock is all fed, many a farm boy goes out to set his traps; pelts bring good cash prices.

Those two boys at the Maryland State Fair who showed how to trap and destroy rats were in dead earnest. Last year rats ate more than 200,000,000 bushels of our grain. That's a big share of all the shiploads of grain we're sending to starving Europe this year.



National Geographic Photographer J. Daxler Roberts

Brother and Sister Drink from the Old-fashioned Well on Their Georgia Farm

Clarence E. Bonton of Ringgold won the shiny tractor when he was adjudged the State's outstanding 4-H boy. Lyda, the sister, shares his pride.

That makes rat killing a gravely important farm job. Four Oklahoma boys lately won free airplane trips to Kansas City for the best rat-killing feat in their county.

Lord Inverchapel, former British Ambassador to the United States, owns an ancestral farm in Scotland. This is one reason why he looked with interest on the farm work of the American 4-H Club boys and girls. He called them "the salt of the earth" and said they're the finest crop that comes from American farms.

British Ambassador Visits an Iowa 4-H Boy

When a 4-H group was calling at the British Embassy in Washington, one of the boys, Roger Newburn, of Eagle Grove, Iowa, got into a friendly argument with the Ambassador about how to handle swine.

"You ought to see how we do it in Iowa," insisted young Newburn.

"Very well," said His Britannic Majesty's

Ambassador, "I'll come out there and see."

"Maybe that's just a polite diplomatic answer," said young Newburn. "Why don't you *really* come?"

"But I *am* coming," affirmed Inverchapel. And he went, on condition that the Newburn family regard it as only a quiet, friendly visit, with no reporters, no newsreels, or publicity fanfare—a confidence they kept (page 553).

"I enjoyed those quiet, interesting days on that prosperous Iowa farm," the Ambassador told me. "I saw hybrid corn, and a mechanical corn picker at work. I even helped with the farm and household chores, got to bed at 9, found Iowa farm food wholesome and tasty, and met some of the Newburns' farm neighbors—an interesting and well-informed group of country people.

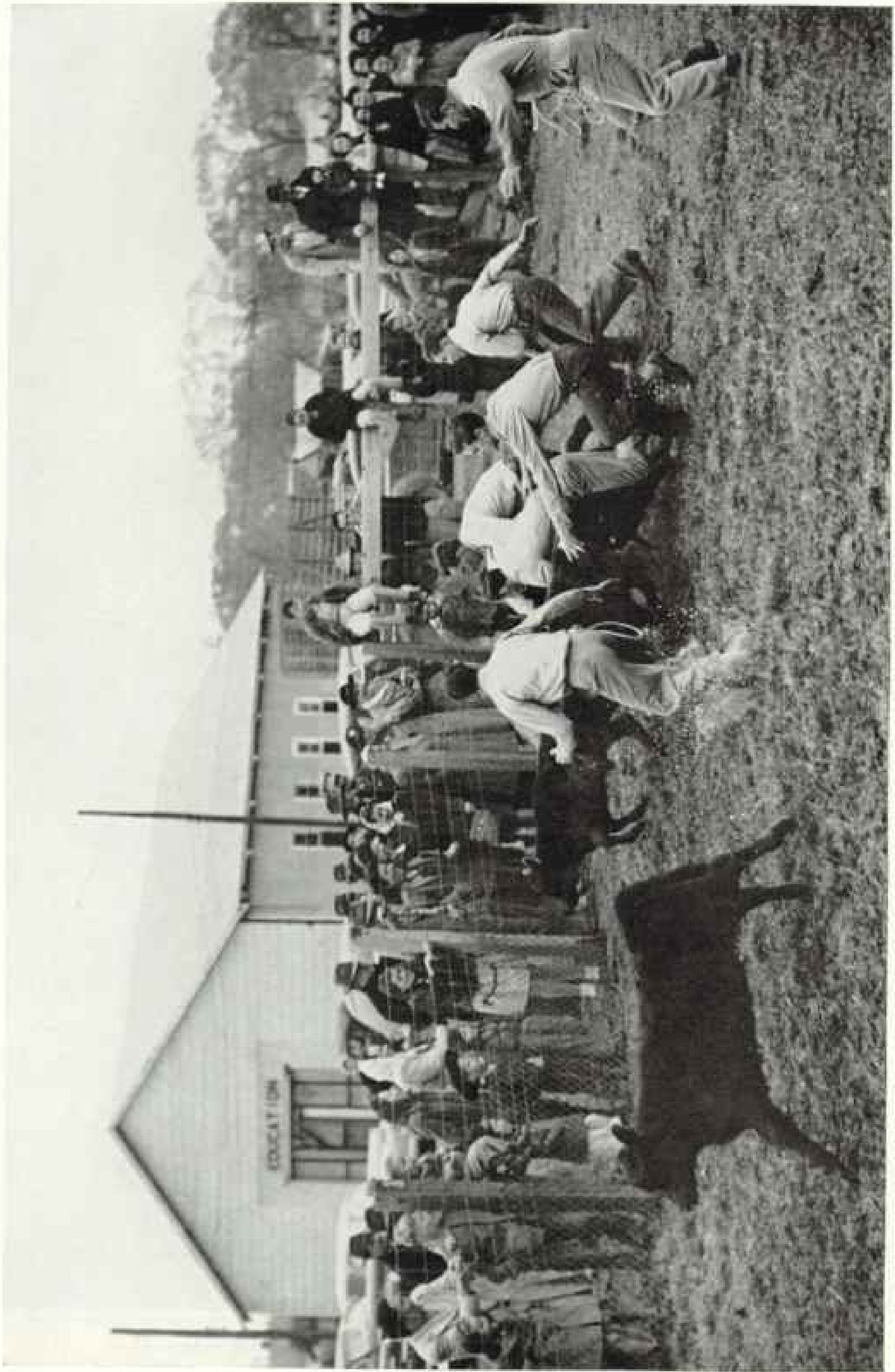
"Later I asked the Newburn family to visit me at the Embassy here in Washington; they came, and we enjoyed many good days together.



Natural Geographic Photographer J. Taylor Roberts

In How Many Barns Has This Time-honored Comedy Been Enacted!

Wily old Jim belongs to James Galbreath, of Harford County, Maryland. Each evening as Jim hears the pails clanking, he dashes to the barn and takes a beggar's stance at the hoofs of these purebred Ayrshires.



National Geographic Photographer J. Arthur Roberts

"Boy, Grab a Calf! Get a Halter on Him and He's Yours for Keeps!"

"Calf scrambles" provide excitement and comedy at fairs and stock shows. When one contestant gets his hands on a calf other lads must stand clear. If the calf breaks away, all others have a chance. This event was given for 4-H boys in Jennings, Louisiana.



National Geographic Photographer Justice N. Locher

A Farm Beautician Braids His Cow's Tail

This Pennsylvania boy, preparing his entry for the York Fair, knows that in the morning, when he combs out the tail, the curly "permanent" will impress the judges. Four-H boys take this aspect of animal husbandry seriously.



National Geographic Photographer John E. Fleisher

Stop Bleating, Lamb! Many Would Envy You That Groom!

This Nevada miss is making a pretty sheep picture for the stock-show judges in Reno. A nervous bleat confirms the ovine look of despair—the lamb doesn't enjoy the stiff wire brush.



Dept. of Public Information, USAMGIK

Uncle Sam's Army Plants the 4-H Clover Leaf Symbol in Korea

Here in Keiki Province, birthplace of the idea, a thousand Clubs have enrolled more than 25,000 members. Many are girls, some of whom, departing from Oriental custom, serve in elective offices. The Military Governor of the Province, Lt. Col. Charles A. Anderson, who fostered the Clubs, presides at this meeting. The 4-H banner shares honors with the Korean flag, whose symbol represents the universe locked in perfect balance—heaven and earth, fire and water, heat and cold, etc. Under United States tutelage, Southern Korea became a republic last August 15.

"Afterwards, I went to Kansas City, to the Future Farmers of America Convention, and took six young British farmers. I introduced them to some of the Future Farmers of America. First the Americans found my boys 'good guys,' then 'swell guys,' and finally they promoted them to the top rank of 'regular guys.'

"In Britain we have something very like the FFA in our Young Farmers' Unions. I'm planning to arrange for a large number of young Americans to go over there and visit our farm boys in England, Wales, Scotland, and the north of Ireland during the harvesting season.

"The sound moral and Christian training of 4-H and FFA is one of civilization's best

answers to the warlike youth movements of Hitler and Mussolini."

Ceres Placed Ahead of Mars

I lived two years in Germany, just before Hitler, and saw his youth movement in the making. Boys used wooden guns, not hoes, and the lesson was how to kill people—not how to help them. In Berlin the Sieges-Allée (Avenue of Victory) was packed then with the giant marble figures of warriors.

Four-H'ers are not pacifists; but they see more gorgeous, elemental beauty in a fat steer or in a golden sunset over a waving field of green corn or a sea of ripe wheat than in a flock of statues. They put Ceres above Mars.



Ralph Moran

Figures on Steers' Rumps Indicate Catalogue Numbers at a Union Stock Yards Sale

Each season 4-H cattle raisers from Rocky Mountain and Midwest States show their animals at Denver's 4-H Club fat-beef sale. Kids on the rail await their turn to lead steers into the ring. The boy on the left points out a prime beef to a prospective buyer.

At Chicago last December, 1,100 of them attended the National 4-H Club Congress, chaperoned by their State Club leaders and county extension agents. They entered carloads of fine animals at the International Live Stock Exposition. They appeared on scores of radio broadcasts, heard some of the best music, carried out a program of group discussions, took in the sights of the city, and were entertained by sponsoring industrialists—Swift & Co., General Motors, Kraft, Spool Cotton Company, International Harvester, and others.

Here, also, they were awarded the scholarships, prizes, and other recognitions for their outstanding achievements in 4-H activities.

By hundreds they flocked to special breakfasts, lunches, banquets. "Ham and speeches,

ham and speeches," said one boy. After one such exciting party, I saw a farm girl walk into the lobby of the Stevens Hotel in her stocking feet, carrying her shoes. Pavements had proved harder on rural feet than green pastures or plowed fields!

There I met some of Lord Inverchapel's young farmer friends from the Mother Country; also youthful visitors from Poland, China, Canada, Sweden, and Latin-American lands, and heard stories of 4-H work overseas.

One young lady I talked with had just come from the land of bagpipes and oatmeal. She was Jean Kinmond, ex-schoolteacher of Dundee, Scotland, sent over here by J. & P. Coats, Ltd., a firm which for generations has made thread in Scotland.

"I've come to study your 4-H work," she



National Geographic Photographer Richard H. Stewart

Want to Build an Automatic Hog Waterer? Ask These Maryland Girls

At the State Fair in Timonium they demonstrated with scraps of lumber. "Build your trough watertight," advised the one with the hammer; "otherwise it will leak and make the pen muddy." A young farmer needs to know that a pig's stomach is small, so he must drink often.

said, "and hope I can apply some lessons learned here to youth training in my homeland."

It's widespread, this 4-H work. Before me lie pictures of pulchritudinous Honolulu 4-H belles who juggle coconuts on the beach at Waikiki and wade knee-deep in plantation pineapples.

4-H at the White House

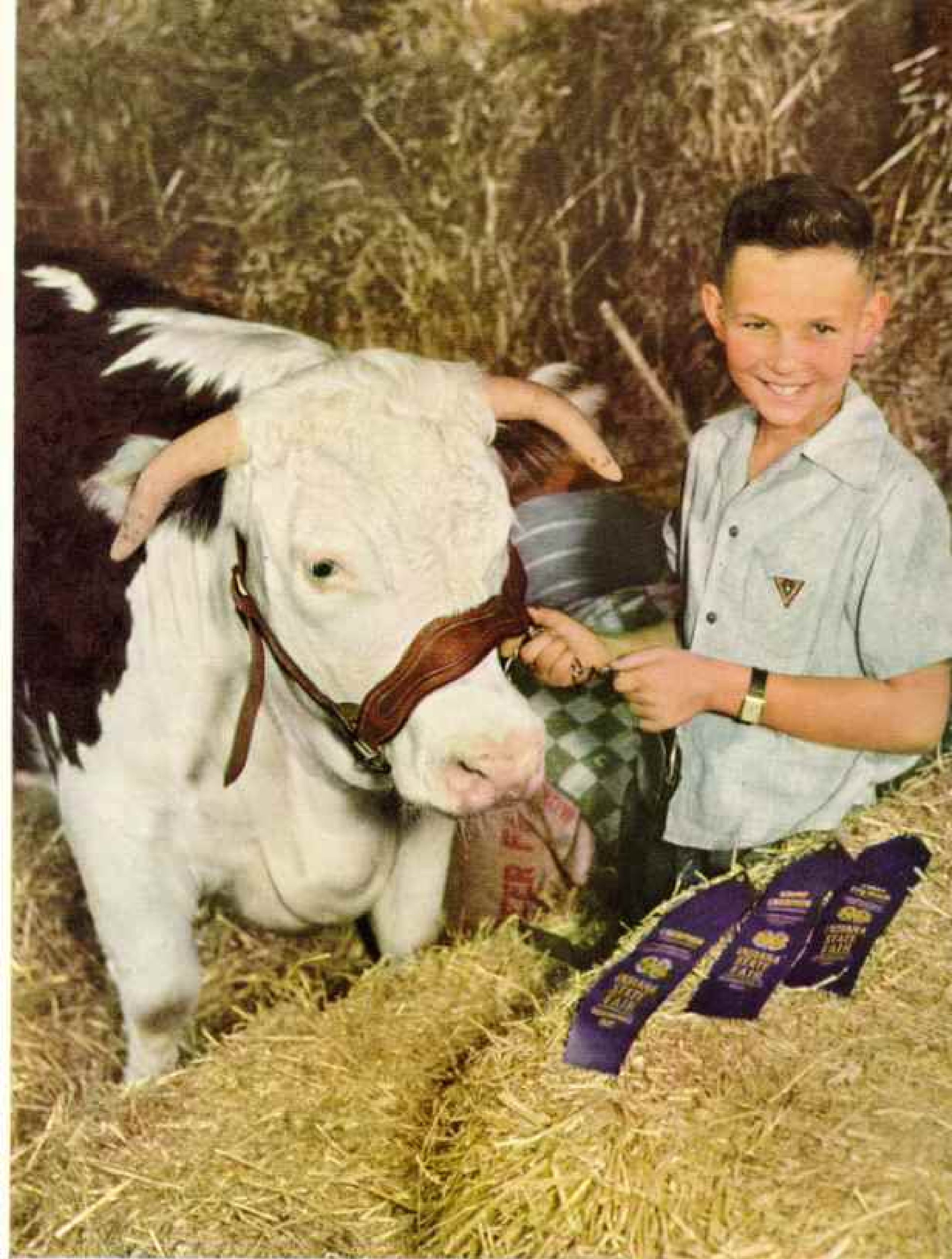
Each year in June hand-picked groups of 4-H'ers visit Washington to see Uncle Sam's Federal workshops in full blast. They camp at Arlington Farms, on the Virginia side of the Potomac, or stop at Washington hotels.

Learning how our Government works, or ought to work, and learning how to vote with

honesty and intelligence, are also 4-H duties. So these young Americans come to look at Congress, the National Bureau of Standards, Smithsonian Institution, Naval Gun Factory, the Supreme Court, the plant that prints paper money, stamps, and bonds, the NATIONAL GEOGRAPHIC MAGAZINE offices—even the Zoo.

Usually they have their picture taken on the White House grounds with the President. Also, they lunch out at the Nation's Agricultural Research Center at Beltsville, Maryland, where some of the most scientific farm adventures in our country are being staged.

There they get science's last word on how to produce more meat, bread, and potatoes; then they go home to tell their colleagues how and what America must do to help feed a hungry world.



This Classic Pile of T-bones, Short Ribs, and Hamburger Is the Pride of an Indiana Boy

Here a 10-year-old 4-H member at the State Fair exhibits his 990-pound yearling Hereford steer, Prince Mixer 50th. The lad also raises corn and pigs on his father's 500-acre farm as part of his 4-H work. One of the proudest achievements of the Nation-wide 4-H is the cooperation it encourages between father and son. With the help of cash prizes won at fairs, many 4-H boys go on to agricultural colleges.

This City Club Proves Not All 4-H Girls Are Farmerettes

Twenty-five years ago Portland, Oregon, became a pioneer urban center in adopting the farmers' 4-H method of training young citizens.

These industrious Portland girls set an example to future homemakers all over the United States. Each will carry into her marriage the old-time skill which made every American housewife her own dressmaker. Needle art will enhance her pride as well as the family purse. She need never suffer the boredom of idle hands.

Mrs. E. F. Wright, who has counseled 4-H Clubs for 18 years, here demonstrates the way to hemstitch a hand towel. Some 200,000 men and women like her contribute their time and energy to leading 4-H crusades. They and their predecessors have trained 14,000,000 American youngsters.

The third line of the 4-H pledge, "My hands to larger service," is here vividly demonstrated. On the table stands the Club's four-leaf clover flag; its "H's" stand for "Head, Heart, Hands, and Health."

© National Governors Society

Illustration by John B. Frazier



Four Pounds of Rabbit Will Soon Be Husempfeffer

New Zealand Whites, raised primarily for meat, are the 4-H project of Anna Mae Mudgett of Santa Rosa, California. Her rabbits gain a pound for each 3 3/4 pounds of feed. They fetch top prices, she finds, around eight weeks in age.

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Illustration by Willard H. Guver



Is She Popular with the Bigger Hoosier Appetites?

Nancy Burchell of Lebanon displays a blue-ribbon winner in the Indiana State Fair's home baking contest. Ask the judges who ate the slices missing from these toothsome cakes.

Illustration by J. Taylor Roberts





© National Geographic Society

Illustration by J. Dayton Roberts

★ **To Save the Nation's Soil from Erosion, Young Marylanders Study Surveying**

Each summer 5,300 camps bring 4-H members together. There they see scientific demonstrations of contour plowing and other erosion controls. Fun consists of folk dancing, singing, swimming, and archery.

✧ **Hens Started This New Hampshire Project; Automatic Machinery Completes It**

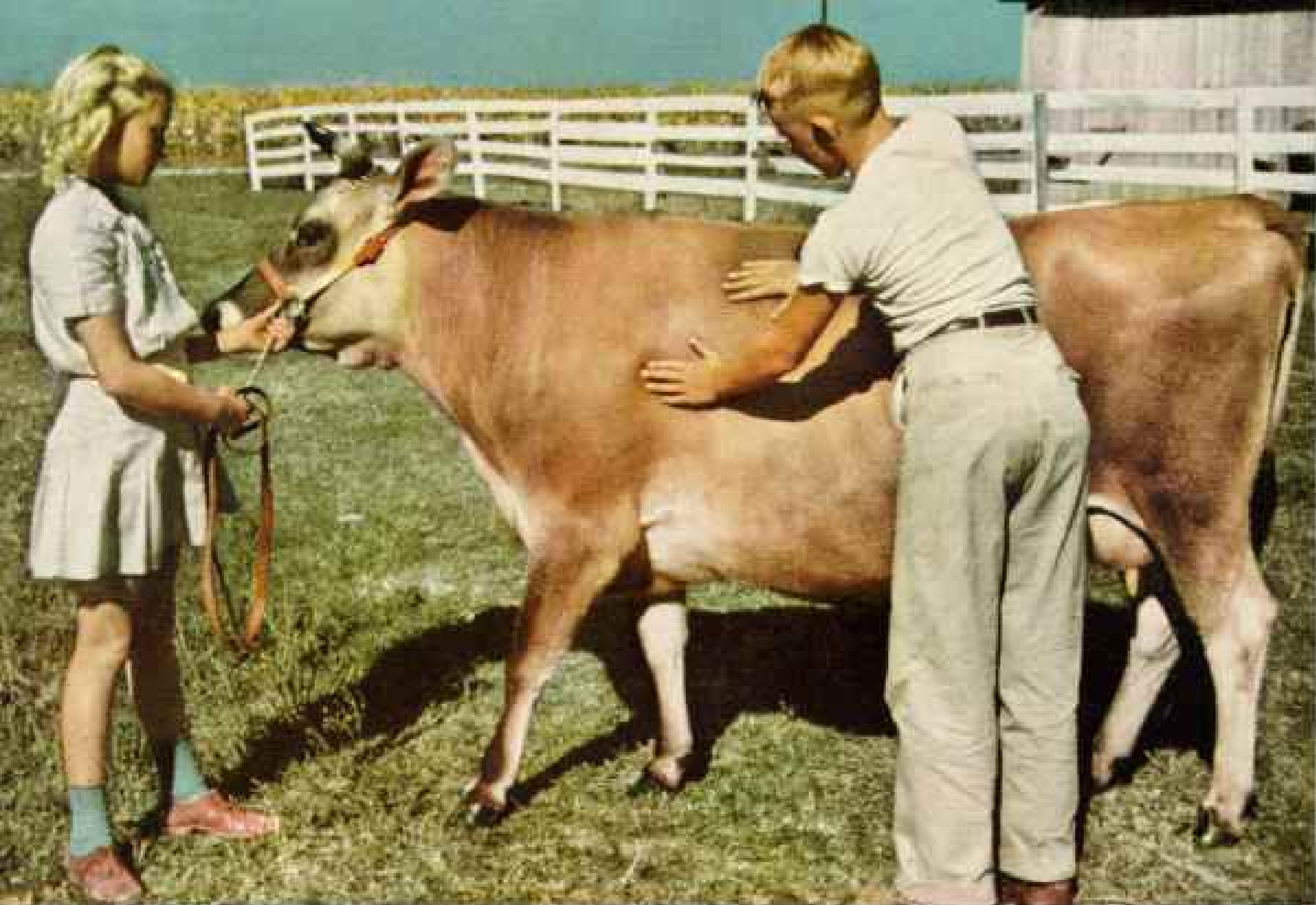
Louise A. French of Boscaawen transfers eggs from baskets to grader. As they feed into the hoops, the eggs roll into separate bins according to weight. In the same operation each egg is candled to ensure freshness.

Illustration by Robert F. Stone





"Nicotina," Queen of the Tobacco Festival, Thanks Her Champion for a Golden Tribute
At Charles County Fair, La Plata, Maryland. Elizabeth Greer congratulates Bill Hardesty on having won the 4-H blue ribbon. He bears five hands of air-cured Maryland tobacco.



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Kulachikov by F. C. Allen and Ben

↑ **To Impress the Judges, a 4-H Showman Shines His Jersey Heifer by Hand**

Robert and Nancy Gilliland, who live near Crawfordsville, Indiana, realize that hide and hair indicate the animal's quality and care. Boys and girls in dairy projects like theirs have built up herds of a dozen animals within five years.

✦ **Colorado Snow Sliders, Drying Out, Turn Their Toboggans to the Sun**

The hike is a standard part of each year's 4-H activities. These boys laboriously climbed to high Lake Agnes. They hastened the return and relieved tired feet by shooting down a mountain snowbank. An animated clothesline, they here bend over a log.

Kulachikov by W. B. Nelson





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Illustration by John E. Fletcher

↑ Project Cowboy Is More Fun than Work, These Oregon Brothers Find

On their parents' 400-acre farm near Halsey, the Holmes boys raise not only purebred Herefords but blue-blooded swine. Gary (holding rope) has exhibited a grand-champion pig and Vernon (heating branding iron) a blue-ribbon steer.

↓ Piggie, Engulfed in Soapsuds, Endures a Dog's Life for the Show Ring

In Indiana, Fritz Schnepf, Jr. (right) polishes his barrow for a trip to Chicago, and Tom Allen helps. At the International Live Stock Exposition's junior judging contest, Fritz placed first and Tom second. Their team ranked first.

Illustration by J. C. Allen and Tom





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Kodachrome by Robert P. Simon

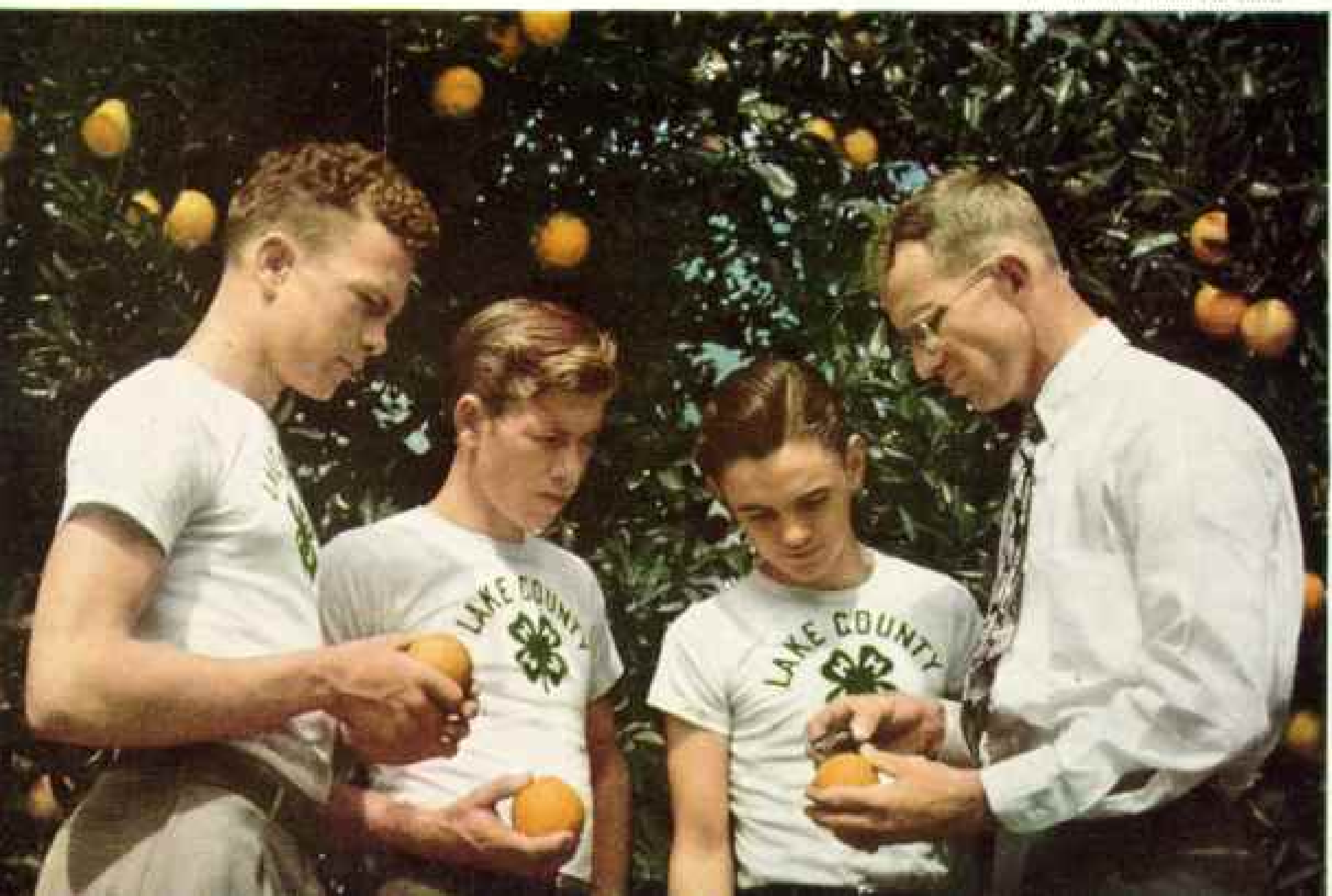
♣ **The 1949 4-H National Calendar Picture Has Been Painted, and Here It Is**

Edward Downey and Doris Sunderland, both of Maryland, did not pose for the painting, but they did present it to Milburn L. Wilson, Director of Extension Service, United States Department of Agriculture. S. Douglass Crockwell was the artist.

♣ **Florida Boys Studying an Orange Engage a Small but Deadly Foe**

Beneath the glass, Assistant County Agent Jim Watson has spotted the citrus rust mite. His students are serious observers, for they own 3,000 young trees in their nursery. They are members of the Umatilla 4-H Citrus Nursery Club.

Kodachrome by Willard H. Carter



Portugal Is Different

BY CLEMENT E. CONGER

OUR powerful Constellation, inbound from America, sailed serenely over the white Tower of Belem, standing on the bank of the River Tagus. Far below us tiny sailing vessels, with strangely upturned bows and lateen sails, tacked across the stream (page 602). They brought to mind the great discoverers who set forth from this same harbor.

Graceful as an eagle, our plane set down on Lisbon's new Portela de Sacavem Airport. My taxi driver raced across the several miles from the airport to central Lisbon (page 603).

Swiftly leaving the country behind, we flashed by the bull ring and in a moment were squirming through narrow, winding streets full of cars and horse carts. Pedestrians, many carrying loads on their heads, walked in streets as much as on sidewalks.

Other taxis missed each other by the proverbial coat of paint. Streetcars rang warning bells, but cabbies paid no heed.

We dashed up hills, rounded curves, and careened across intersections with horn wide open.

Arriving safe but breathless at my hotel, I knew how Sir Malcolm Campbell, the daredevil racing driver, felt when reporters asked his first impression of Lisbon (Lisboa). Reflecting on his taxi ride from airport to hotel, he is quoted, "I've never been so scared in all my life!"

Lisbon's hotels, like those in all major cities, are likely to be crowded, but they are pleasant and inexpensive.

Lisbon, a Medley of Colors and Noises

Portugal's capital is as colorful as it is noisy.* Each building is a different pastel shade—pink, blue, green, or yellow. Brilliant flowers garnish walls and lawns.

In their way, most of the city's 800,000 people are equally colorful. Women carry all manner of things on their heads—boxes, baskets, furniture, mattresses, even desks, but mostly fish.

Lisbon calls its statuesque fishwives *varinas*. They take their name from Ovar, the coastal town from which they came. Varinas form a tight society of their own. In their veins flows Phoenician blood. By the thousands they peddle fish from door to door on flat, head-borne trays (pages 584, 608 and 609).

Frequently you will find a pair of tired-looking shoes resting on a fish tray. Barefoot varinas carry shoes, as Englishmen carry

umbrellas, for emergency use. If a policeman reprimands one for breaking the ordinance against bare feet, she makes swift amends. Her shoes lie within easy reach; quickly she slips them on if needed. Once the law is out of sight, she replaces shoes on fish, and comfortable bare toes grip mosaic sidewalks once more.

Shrill and persistent are the fishwives' sales cries, and not unmixed with vituperation. Other peddlers are just as noisy.

Here and there roosters and hens add their cackle to the din. In World War II, Lisbonese began raising chickens with a vengeance.

War changed the face of neutral Portugal but little. Neither Axis nor Allies cared to overrun the country, whose 8,000,000 inhabitants and Maine-size area offered few serious obstacles (map, page 587).

Lisbon became the warring world's crossroads for the exchange of mail and information. Spies moved in by the score. Portuguese financial houses supplied native currencies to equip Allied secret agents dropped into enemy-held countries.†

Meanwhile the Government, having a British alliance dating from 1373, made the Azores available as anti-U-boat bases.‡

Exit Spies, Enter Tourists

Today the aura of international intrigue is gone; the Portuguese are their smiling, friendly, uninhibited selves. They are the delight of travelers who appreciate old customs, character quirks, and costume dress.

Phoenicians came trading to Lisbon more than 2,000 years ago. Nowhere did they plant their heritage more enduringly. Sailboats of Phoenician design still ply the Tagus (Tejo) River by the thousands.

Opening up from the river front is the spacious Praça do Commercio, known for two centuries as "Black Horse Square" because of an equestrian statue of King José I.

* See, in the NATIONAL GEOGRAPHIC MAGAZINE, "Lisbon, the City of the Friendly Bay," by Clifford Albion Tinker, November, 1922, and "Castles and Progress in Portugal," by W. Robert Moore, February, 1938.

† See "Lisbon—Gateway to Warring Europe," by Harvey Klemmer, NATIONAL GEOGRAPHIC MAGAZINE, August, 1941.

‡ See, in the NATIONAL GEOGRAPHIC MAGAZINE: "American Airmen in the Azores," 10 ill. in color, February, 1946; "European Outpost: the Azores," by Harriet Chalmers Adams, January, 1935; and "New Map of the Atlantic Ocean," by Leo A. Borah and Wellman Chamberlin, September, 1941.



Pan American World Airways

Saleswomen with Fishy Wares Aloft Parade Through a Lisbon Market

From fashionable avenues to narrow alleys, these sturdy peddlers invade every quarter. They sing out their goods with piercing cries. Reared on sandy beaches, they would gladly tread the cobbles barefoot were it not for the *police* (foreground), who see that they go shod (pages 583 and 609).

Buildings on the square and streets of the lower town were constructed by Prime Minister Pombal, who undertook the task after the earthquake of 1755. Quake, tidal wave, and fire wiped out more than 10,000 people and a large part of the capital. King José asked his Prime Minister what was to be done.

"Sire," replied Pombal, "bury the dead and take care of the living."

Second square up from the Tagus River is the ever-crowded Rocio (Rossio). Long ago it was nicknamed "Rolling-Motion Square" by British sailors dazzled by its undulating mosaic designs. An optical illusion conveys a rolling motion almost to the point of seasickness. Though the major portion has been removed as a traffic hazard, enough of the original remains to disclose the beginnings of Lisbon's miles of mosaic sidewalks.

High above one corner of Rolling-Motion Square an elevator, designed by Eiffel, connects the lower and the upper city, saving pedestrians hundreds of backbreaking steps

(page 586). A one-way fare is less than $\frac{1}{2}$ cent American. Funiculars climb other Lisbon hills.

Thousands Drink Coffee on the Avenida

Beyond the arabesque railway station is the third of Lisbon's central squares, Praça dos Restauradores. Here begins the magnificent promenade, Avenida da Liberdade, familiarly known as the Avenida. Two side streets, two parkways, and a central avenue fill the Avenida's 300-foot width.

Here on a summer evening I saw thousands gathered in block-long sidewalk cafés sipping coffee or beer and watching passers-by. Frugal folk can make one coffee last an hour.

At the top of the Avenida I came upon Estufa Fria (Cold Hothouse). Thirty ordinary greenhouses could be placed under its cover. Estufa Fria contains miniature hills, lakes, fountains, and ducks, geese, and peacocks. A roof of wooden slats, set about half an inch apart, maintains a cool temperature



Alamy from Three Lions

A Sidesaddle Equestrienne with Perfect Aplomb Rides Past a Don Quixote Windmill

This type of grain grinder, at which the Spanish don thrust a lance, is fast becoming a relic. Powered machinery is taking its place. Newer windmills stand on steel towers; aesthetic Portuguese think "they insult the landscape."

in summer. In winter, sun and sheltering rock keep the garden warm.

I climbed from the lower city to the Sé Patriarchal, or Cathedral, begun in 1150 in Romanesque style by the first King of Portugal. Its fortified towers stretch so high that the Cathedral was chosen as an appropriate place from which to cast to his death a bishop who conspired with the Spaniards.

Stay-at-home Wives Shun Night Life

Lisbon friends insisted I see something of their night life.

For an establishment unaccustomed to Western food or music, we searched the winding, dimly lit streets of Lisboa Occidental.

Finding one, we entered an unmarked door, past casks of wine, into a dining room lined with photographs of native bullfighters, screen players, and radio performers. Here fine steaks are the rule. A friend whispered, "It's all right to eat the steak; we Portuguese don't kill the bulls in our rings."

During dinner the light dims and a shrill feminine voice rises in the peculiar pitch of the *fado* (Portuguese folk song, from *fatum*, fate). The singer tells a story of unrequited love, jealousy, heartbreak, and ancient glories.

"The first one or two *fados* are by professionals paid by the house," my friend explained. "After that, individual diners arrange their selections with the guitarist and stand up and sing."

The audience applauds all, but exchanges knowing glances about inferior ones.

Meanwhile, handsome bullfighters sit with their backs to the wall. The crowd is composed almost entirely of men. Portuguese wives seldom see the bright lights; the few who do are objects of curiosity.

My friend pointed out a young woman from the American Embassy and said, "Nothing is thought of the presence of foreign women here, but Portuguese women—ah, that is a different story."

Back on the Avenida, I visited Bar Crystal,



Pan American World Airways

Lisbon Solves Its Ups and Downs with an Elevator Which Seems To Be Going Nowhere

Rome's fabled hills were mounds compared with Lisbon's. Municipal ascensores save daily "mountain"-climbing. A ride costs less than 5/10 cent (U. S.). This eight-story cage meets an iron bridge (here obscured) leading across rooftops to a higher terrace. Gustav Eiffel, designer of the Paris tower, was the creator.

a club full of mirrors and neon in the Manhattan tradition. One mural shows the New York skyline. Other decorations satirize ancient Grecian and Portuguese life. The orchestra specializes in Latin music, but at least a third of its selections are American fox trots played in the jazz manner of 1937, and the dancers achieve an odd bouncing effect.

Relics of Portugal's Golden Age

Leaving central Lisbon, I journeyed down the Tagus to near-by Belem (Bethlehem). Belem preserves three reminders of Portugal's glorious past. They are the Tower of Belem, the Monastery of Jeronymos, and the National Coach Museum. Senhor Trindade, a tourist official, was my guide.

In the midday heat we walked to the Tower. All brilliant white, the fortress-palace stood like a sentinel beside the Tagus (page 600).

Climbing to a battlemented parapet, Senhor Trindade and I inspected the gargoyles. Strangest was the figure of a monkey playing a violin.

If ever any one structure signified an entire country, it is this Tower—the heart of Portugal. In 1497 Vasco da Gama set sail from the site on his epochal voyage around Africa to India. Diaz knew this spot when he began the first voyage around the Cape of Good Hope in 1487. So did Cabral, who took possession of Brazil in 1500. Affonso de Albuquerque passed by on his way to India.*

Not so large as Virginia, Portugal in the 16th century ruled more than half the known world, thanks to her intrepid voyagers.

Stone Elephants Bear Kings' Tombs

The huge Monastery of Jeronymos occupies the site of the Seamen's Home founded by Prince Henry the Navigator (page 604). King Manuel I vowed to erect a convent there if Da Gama's voyage to India succeeded. He laid the foundation stone a few weeks after the discoverer's return.



Drawn by H. E. Hartwood and Irvin Allaman

Portugal, the Size of Maine, Explored Half the Globe in the Great Age of Discovery

I looked up at the monastery's door and marveled at its magnificence. The ornate style, Manueline, is named for the King whose rule climaxed Portugal's golden age.

"Come inside," said Senhor Trindade, "and I shall show you one of your heroes." Entering, he pointed to a marble tomb. I read the

* See "Pathfinder of the East (Vasco da Gama)," by J. R. Hildebrand, NATIONAL GEOGRAPHIC MAGAZINE, November, 1917.

stone lettering. I was standing at the resting place of Vasco da Gama. He had the vision to sail into the unknown and find the sea route to India. Light through stained glass played a spectrum over his vault.

I went exploring. In the transepts, black stone elephants, tusked with Indian ivory, bore the tombs of ancient kings.

In the National Coach Museum we found dozens of gilded coaches bearing witness to royalty's bygone brilliance. Two plain coaches surprised me; I was told they were for the illegitimate children of a king. Three coaches were used by an 18th-century ambassador to the Vatican.

He required more than 500 horses and mules for his year-and-a-half trip across the Pyrenees and Alps.

Coal Scarce, Wine Abundant

Next I took passage north on a glittering all-steel American streamliner, incongruously drawn by an ordinary black wood-burning engine. Portugal, like many other countries, was short of coal.

My destination was Pôrto, the Douro River harbor specializing in port wine (page 597).

As early as 1300, London merchants started importing port as relief for winter's colds. In 1703 Britain and Portugal signed the Methuen Treaty regulating trade.

In consequence, a big industry and an important city—port and Pôrto—grew side by side on the Douro.

Likewise, the national name originated here, for Pôrto grew from the harbor at the mouth of the Douro called *Portus Cale*, from which the word Portugal came.

A visitor to downtown Pôrto might think he was in an American city were it not for the two-wheeled oxcarts. Wooden yokes, almost two feet high, clamp the longhorn oxen together. Carved and painted, the yokes bear designs of ancient origins.

Fishes are common motifs, presumably early Christian. Stars call to mind old astrological cults. Crosses are supposed to inhibit witches from taking free rides. Bristling tufts of horsehair line the yokes' upper edges.

To learn about port, I called at the Institute of Port Wine, supervisor of the industry. Its director explained how it functioned as a Government agency to safeguard the trademark "port," and to guarantee the wine as produce of the Douro district.

To see the vineyards, I went by train to Pêso da Régua, a Douro-side town in the wine country.

On the river I saw two curious sailboats, called *rabelos*, heading upstream with billow-

ing sails and empty casks (page 596). I could see steersmen operating the boats with sweeps set in high stern platforms.

These boats' sole purpose is to haul wine to Pôrto. At first glance they appear to be clumsy antiques. Actually, they work in efficient rhythm with the seasons.

When spring thaws swell the Douro, the wine-weighted boats coast downstream. Empty, they return in summer. Then the prevailing wind, switching directions, drives them against the current. Lack of cargo helps them cross shallows exposed by summer's drought.

In Pêso da Régua I called at the Casa do Douro, control office of the region's wineries. Eduardo Mendia de Serpa Pimentel, its assistant director, said:

"My friend, there are no secrets in the making of port. A hot, mountainous terrain favors the grapes. Vines grow on the terraced stairsteps of canyons dug by the Douro and its tributaries."

Rich Soil Is Built by Hand

Mountainsides are composed of mica schist, a rock which forms a flaky soil rich in grape-stimulating chemicals.

Senhor Pimentel and I, touring vineyards built during the last 400 years, drove past hillsides terraced to the skies. Retaining walls were of granite dragged into place by hand. Blocks of schist for soil were moved in the same backbreaking manner. Spring rains often washed walls and soil away; then work had to start all over.

We watched young wall builders lay granite blocks just as their fathers had done for countless generations.

For helpers they used their small brothers, some no more than 10 years old, I judged. These pitiful youngsters, climbing precipitous slopes, bore rocks on their backs. Their tired, old-man faces seemed expressionless.

"*Vossa Excelência*" (Your Excellency) or "*Boa tarde*" (Good afternoon), they greeted us. Then they dumped their loads and trudged away for more.

Senhor Pimentel pointed out a gorge where in 1792 a tremendous rock was blasted out of the river. Removal of this navigational barrier extended the port district to the Spanish border and doubled its area.

Treaders Crush Grapes to Music

My guide explained that every grape was fathered by American rootstock. The imported root resists insects of the genus *Phylloxera*, a grape louse which began to ravage Portuguese vineyards in 1862. In their second



João Martins

Whirling Skirts Balloon Like Doughnuts as Póvoa Folk Perform a Ballet on the Sand

Lighthearted Portuguese, with gay costumes and melancholy ballads, strive to preserve the simple life in the machine age. The *vira*, illustrated here, is a quadrilateral dance executed by two boys and two girls.

year American roots receive a graft of native stock.

Senhor Pimentel continued: "The vintage starts in September and October, when the grapes have ripened. They are carried to *lagares*, big stone tanks. Sulphur is added to help fermentation. Then treading begins.

"Here the men, barefooted and barelegged, lock arms and tread back and forth, crushing the grapes.

"Often they tread to the rhythm of accordion music. They are required to take every sanitary precaution. Violent fermentation guarantees purity.

"Centuries old, the foot method crushes the grapes evenly and keeps the must (new wine) in steady movement. Machinery cannot equal the process; superior results can be obtained in no other way."

Each day the must is permitted to rest. On the next it is retreaded. At the right moment the liquid is drawn into vats. Brandy, a fifth by volume, is added to check fermentation and preserve natural sugar.

After 20 strenuous days treaders relax and enjoy a fiesta.

Returning to Póvoa, I watched the tasting of port wine. To do so, I crossed the Douro

to the suburb of Vila Nova de Gaia. There British and Portuguese merchants store wines in lodges (warehouses) for export.

Managers of Casa Ferreirinha, one of the largest Portuguese firms, took pride in showing me about their centuries-old lodges. As far as eyes could pierce the gloom mountains of cobwebbed casks stretched, and endless rows of bottles lay on their sides. I saw men testing, women bottling and labeling.

Testers, sampling the flavor, do not swallow the golden nectar; instead they spit it into what must be the world's largest cuspidors. These are bowls of white porcelain raised to chin height. They reminded me of drinking fountains.

Foster's Music Hails Portuguese Leaders

My next journey took me to Braga, a city north of Póvoa.

There Portugal was celebrating the Revolution of 1926, which ended a series of revolutions and installed the present stable Government.

Co-leader of that revolution was Marshal António Oscar Fragoso de Carmona. Though 79 years old (born November 24, 1869), he was still Portugal's President (page 592).

To settle his country's shaky finances, Carmona called Dr. Antonio de Oliveira Salazar, a university professor, to head the Finance Ministry. Later Salazar became Portugal's Prime Minister and kid-gloved strong man.

In Braga I saw a demonstration of the affection in which Portugal holds its leaders. Near the crumbling city gate Carmona and Salazar changed cars. A crowd surged in to cheer them and shake hands. Though any assassin might have taken advantage of the moment, the leaders seemed unperturbed. As far as I could see, they had no guards.

At that moment the National Republican Guard band struck up a tune. I could not believe my ears. I hummed the rhythm. Yes, it was true. Stephen Foster's "Way Down Upon the Swanee River" was the selection. Everyone cheered.

A Portuguese newsreel man winked at me and said, "They're playing it just for you."

I found out later that the people love Foster's music. Sousa's is second in popularity; his father was of Portuguese descent.

After a military parade I inspected the early 12th-century Cathedral, whose mellow stone seemed almost ready to disintegrate. "As old as the Cathedral at Braga," say the Portuguese, to express antiquity.

Ruined Citânia—Who Lived There?

Not far from Braga I climbed a hill to view Citânia, a ruined Iberian city of ancient times. Like Pompeii, Citânia has been unearthed. Four concentric walls still encircle its stone houses.

Rarely did a house have more than one room; a few were circular. Roofs must have been thatched. Original gutters in narrow streets still carry off rainwater. Another drainage system runs beneath the houses.

Archeologists have found traces of Roman civilization, notably Roman mileposts, but they have failed to solve Citânia's riddle. The story of its Iberian people vanished with them.

On roadsides near by I discovered contemporary houses not very different from the ancient city's. These are homes of the very poor. They have no chimneys; smoke eddies through roof tiles, so that they appear to be on fire. In smoky one-room interiors all family activities take place, just as they must have in the deserted city on the hill.

Roadsides and Stations Beautified

With Jim Cameron, a Scottish friend, I next toured the magnificent valley of the Vouga. A small, clear river, the Vouga flows from the snow-covered 3,000-foot Serra da Lapa.

In the valley we saw farmers threshing grain

as in Bible times. Their horses and oxen, dragging heavy weights, circled threshing floors. In small towns sheep and goats casually roamed main streets.

Here and there we found waters harnessed for electricity. Portugal makes even dams things of beauty.

Portugal's Motor Club devotes 10 percent of its funds to eye-pleasing projects. Flowers enliven highways; geraniums border one road for more than 50 miles. Billboards are rare.

Railroad stations are attractive. Most are covered with blue tiles depicting historical scenes (page 594). Their grounds are patterned flower gardens. On some lines, station-masters submit their gardens in yearly competitions.

How Portugal Goes to College

I journeyed alone toward Coimbra, the ancient university city in central Portugal. Prime Minister Salazar once taught there.

Looking across the River Mondego, I saw the city in all its glory. Crowning a hilltop, it shone like an illustration from a fairy tale. Indeed, I found a fairyland in closeup when I photographed a children's Lilliputian park (page 622).

I wandered through narrow, winding streets. Some were tortuous stairways; a few had unusual names. My favorite was the Street of Confused Palaces. As in olden times, charcoal still hung by the door of a woodshop, and a brush denoted a wineshop.

Here and there one may pick out university students by their class ribbons. A yellow one stands for medicine, red for law, blue for letters, white and light blue for science.

In Coimbra's annual May festivity, graduates' ribbons go up in flames. Preliminary parades, fireworks, dances, and bullfights delight visitors. Then comes the climax; the ribbons burn in an intimate household utensil.

Typically collegiate students go about hatless, in long frock coats and flowing black robes.

As in most countries, the freshman has a difficult time. Seniors may mobilize him to declare his love to a fair passer-by or deliver a speech on "The influence of codfish on telephone wires." If the freshman refuses, he may be tried, and the punishment can be painful, sometimes in a difficult position. At night advanced students roam the town with scissors, wooden spoons, and clubs. Scissors give the out-of-bounds freshman an irregular haircut; spoons pound his fingernails; clubs are rarely necessary.

Turning southwest, I found the little town of Nazaré (Nazareth) nestling under a cliff





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1931

In Braga, the Republic Reviews Two Decades of Tranquillity under President Carrmona (Right) and Prime Minister Salazar (Left)

Dr. Antonio de Oliveira Salazar, Prime Minister, dresses in austere black. His ruthless economies rescued the country from bankruptcy.

Photograph by Ernest J. Casper

Batalha's Limestone Has Mellowed into Glowing Gold

On the battlefield of Aljubarrota, King João I, newly elected to the throne, defeated the Castilians in 1385, securing anew Portugal's independence and his own crown. In gratitude, the King began building the convent of Batalha (Battle), the equivalent of England's Battle Abbey.

Through his Queen, Philippa of Lancaster, the King had various ties with the English. From her native country the Queen is believed to have obtained design and workmen for the convent. Its exterior bears a striking resemblance to the English Perpendicular style.

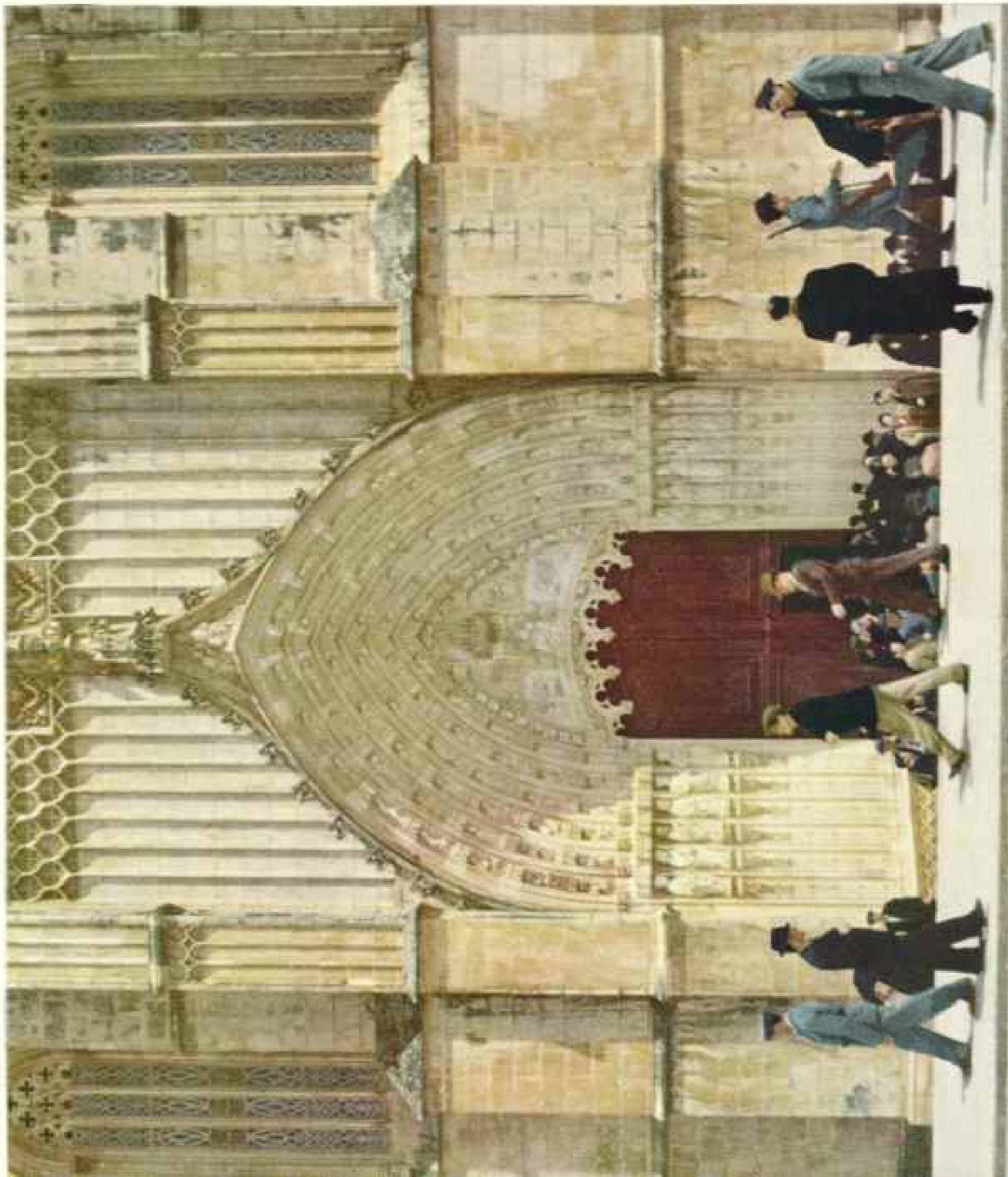
Within Batalha the faithful João and Philippa lie entombed, their stone effigies clasping hands. Prince Henry the Navigator, their son, and Portugal's two Unknown Soldiers likewise rest here.

Saints, prophets, and angels decorate the main portal of this national monument.

In the battle, João's Portuguese had 500 English archers as allies. Tradition says that another stout warrior was the local baker's wife, who slew seven Spaniards with her wooden bread shovel.

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Illustration by Clement E. Cooper





Pictures in Porcelain Illustrate a Street in Ancient Viseu

Everywhere the traveler confronts Portugal's blue and white ceramic tiles, called *azulejos*, an art form inherited from the Moors.

Fitted together like parts of jigsaw puzzles, the tiles compose a variety of pictures brightening the facades of palaces, churches, railroad stations and many houses. Entire walls are covered with picture stories.

Favorite subjects are country life, classical legends, Bible stories, and deeds of the saints. Historical scenes and industrial activities are other favorites.

Black-robed college students admire this view of a rural fair.

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Palace of the Cesares, a Gallery of Old Masters, Is the Lisbon Home of the Countess of Sabugosa
Donatello carved two of the statues. Della Robbia created the sculptured wreaths and busts. Titians and Rembrandts hang inside.

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Illustration by Edmund E. Conner



Wine Carriers on the Douro Hoist Belling Sails; Laundresses on the Washboard Shore Match Them with Flapping Sheets

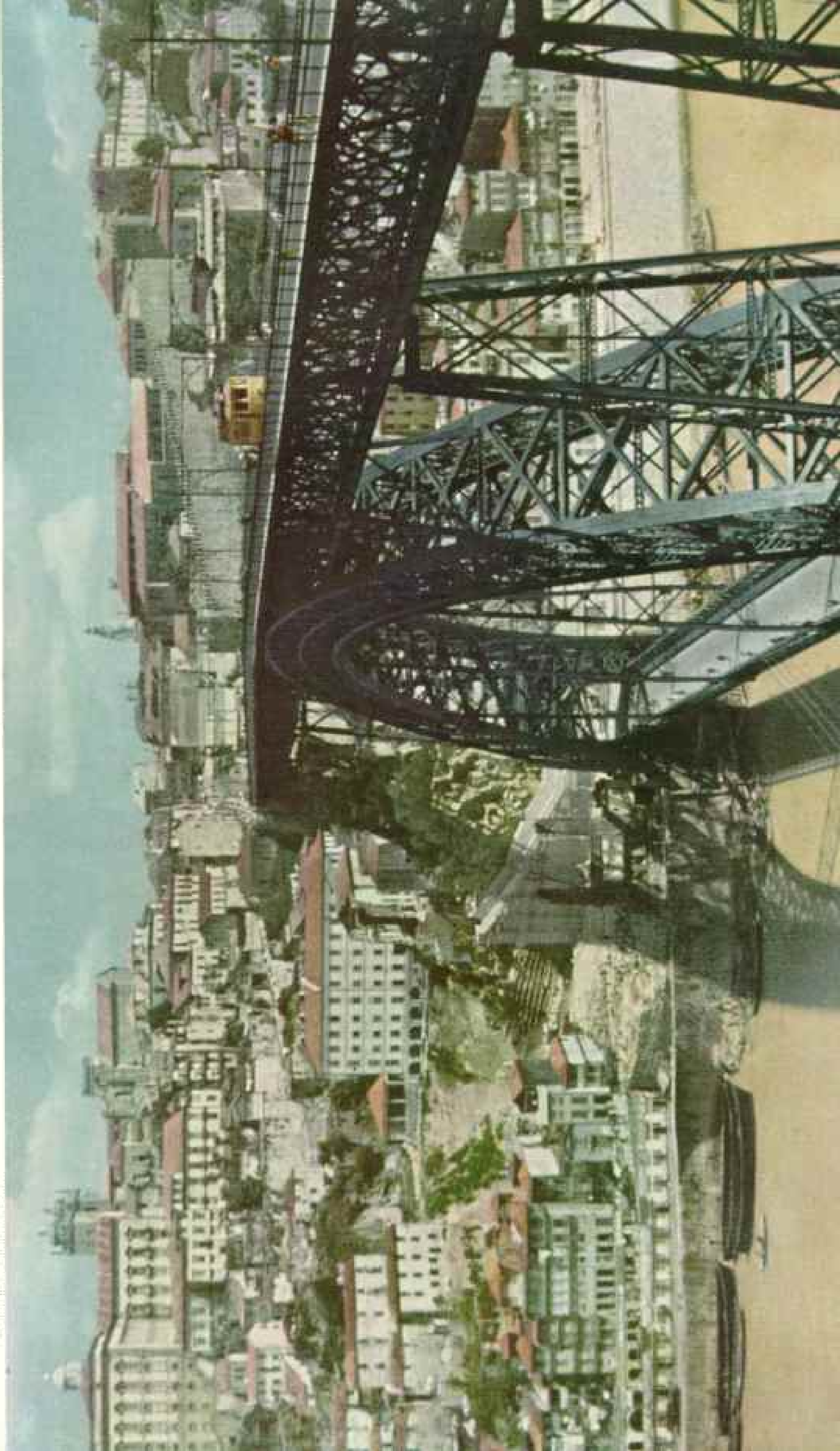
Vintners at Pêso da Régua train vines to stakes (right). These cargoless barges, called *barros rabellos*, sail upstream into the heart of the port country.

A Bridge of Two Levels Serves Pôrto, the Terraced City. Buildings on the Douro's Gorge Seem to Stand on One Another's Roofs Pôrto, which the Romans called Portus Cale, gave its name to Portugal and port wine. British wine merchants have been established here for centuries. Old city walls stand near the upper deck of Dom Luis Bridge (right). Its lower span hangs almost 300 feet below the arch.

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Illustration by Clarence E. Conant





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Reproductions by Clément E. Couper

✦ **Portugal's Abundant Flowers Are Always in Demand in Pôrto's Market**

Blossoms line highways; railroad stations have gardens. Fuchsias are termed "tears"; anemones, "little kisses." Legend says the creeper (called "weeper") tried to scale heaven; it was sentenced to hang.

✦ **A Country Band Plays *Swanee River* and Snarls Traffic in Coimbra for 20 Minutes**

University students hired the musicians to help celebrate the end of examinations. Both parties refused to budge until the photographer finished his work. They tied up streetcars in Coimbra's main square.



fronting the Atlantic (pages 610 and 619).

Nazaré's menfolk are fishermen. I was amazed to find them dressed in tartans not unlike Scotland's. However, the checks of contrasting colors are larger, some a foot wide. Shirts and trousers seem never to match (pages 612 and 614).

Nearly every man wears a *carapuça*, or long stocking cap (page 613).

Outshone sartorially, Nazaré's fisherwomen are content to wear long black shawls. They seldom go to work without their load-battered black felt hats.

900 Monks Chanted Day and Night

A short distance inland I stopped at Alcobaca, a town noted for its magnificent abbey church (page 591). Once this was one of the richest Cistercian abbeys in the world and the grandest in Portugal. In the 12th century Affonso Henriques, first Portuguese king, founded the monastery to signal his victory over the Moors, whereby Portugal became a nation.

An English-speaking padre told me:

"In ancient days services were said here day and night by 900 monks in relays—never pausing, always chanting.

"Come," he bade me, "and see the gigantic kitchen. It has a stream flowing through it."

And so it did. Several feet wide, the stream gave cooks a never-ending supply of water.

Then the padre guided me to the chapel containing the tombs of King Pedro I and Inês de Castro, Portugal's Romeo and Juliet. At Pedro's order their recumbent effigies were placed foot to foot, so that on resurrection his eyes should open on his beloved Queen. There is a famous story, subject of numerous folk songs.

"Inês de Castro, a cousin of the King of Castile," the padre related, "was a lady in waiting of Constanza, bride of Prince Pedro. The Prince was charmed by Inês's beauty. She bore him several children, and when Constanza died they were privately married.

Queen Crowned after Death

"Portuguese nobles, fearing Inês's influence, persuaded King Affonso IV, Pedro's father, to agree to her removal. In 1355 she was executed at Coimbra. After Affonso's death in 1357, Pedro had her judges tortured and slain. The new king then declared his marriage legal. He ordered the dead Inês exhumed, crowned, and enthroned as Queen. Pedro's courtiers were compelled to kiss her cold hand. His nobles bore her body to Alcobaca. And here she rests, crowned after death."

Not far from Alcobaca stands the tiny village of Fátima, named for a Moorish princess. Now each year it is the scene of a Christian pilgrimage. I went to see the largest pilgrimage of all, that of 1946.

On May 13, 1917, three Fátima children tending sheep were convinced they saw a vision of a heavenly figure enveloped in a light more brilliant than the sun's. Speaking to them from above an oak tree, she invited them, they swore, to the same spot on the 13th of the five succeeding months.

That October thousands of Portuguese gathered in hope of witnessing her final appearance.

Witnesses told of seeing a white cloud envelop the children and of strange and fearful gyrations of the sun. A chapel was erected on the spot.

In succeeding years Fátima has drawn a host of pilgrims each May 13. Before 1946 the Vatican had recognized the disputed miracle.

For this pilgrimage the Portuguese engaged virtually every car in the nation weeks in advance. Lt. Donald Scott, Assistant Naval Attaché at Lisbon, and his wife agreed to drive me up to Fátima.

In the mountains the way became crowded. For miles, thousands of pilgrims filled the roads. Some had walked 250 miles on bare feet. Others rode donkeys.

Cold rain fell on the 500,000 spectators at the first day's ceremonies. That evening the pilgrims camped in fields. Fátima had no accommodations for visitors except the sick.

At 11 p. m. the Scotts and I attended an open-air candlelight ceremony. Some 500,000 candles flickered in the pitch-black night and 500,000 voices chanted, "Ave, ave, ave."

Rain Falls; Up Go 700,000 Umbrellas

On the second morning rain fell in torrents. Nevertheless, Fátima had 200,000 additional pilgrims. Each time the heavens opened, 700,000 black umbrellas went up.

That day the Virgin of Fátima was crowned with gold from wedding rings contributed by Portuguese women. A papal delegate set the gleaming cap on her statue. As he did so, the multitude waved 700,000 white handkerchiefs—an unforgettable sight.

On a Sunday I went up the Tagus to the Santarém livestock fair and bullfight. Here, as in other Portuguese rings, bulls and horses are not killed and bulls' horns are padded.

Participants worked in 18th-century costumes. Spectators impartially cheered fighters and bulls. At times they booed the men for taking undue advantage.



Clarence R. Gurney

Tower of Belem Marks the Spot from Which Vasco da Gama Sailed for India in 1497

When completed in 1521 the tower was surrounded by water; now it stands half in, half out of the Tagus. Its turrets were inspired by architecture in India, to which the Portuguese had just discovered the sea route. Built as a fortress, the tower remains a memorial to Portugal's golden age (page 587).

To Americans, it seemed like a day at the circus. They got a laugh when a fleeing fighter vaulted the inner ring. They were thrilled when a single file of *móços*, wearing padded leather breeches, tackled an exhausted bull head on and pulled him to a halt.

Axmen Strip a Cork Forest

Late in June I went to the cork forests in the provinces of Alentejo, south of the Tagus.

Cork, outer bark of the cork oak, may be removed without killing the tree. Most Mediterranean shores are dotted with cork forests.

By Portuguese law an oak may be stripped only once in nine years. Stripping begins when the tree is 20 to 25 years old, but the virgin bark is inferior. Production ends when a tree attains 120 to 150 years.

Manuel Antunes Alves da Silva of the National Cork Board told me that Portugal's cork oaks covered more than 1,500,000 acres and annually produced more than 150,000 tons. He showed me Portugal's largest cork oak, said to be more than 1,000 years old. Three men's outstretched arms could not encircle its gnarled trunk.

In the oak forest the stripping had begun. Axmen climbed trees and cut bark. Disrobed,

the trees blushed a deep pink (pages 615 and 616).

On Rio Frio, Portugal's largest farm, I saw 7,500 acres of cork oaks planted in rows and 15,000 acres of oaks growing at random. Thousands of hogs fed on their bitter acorns. In other oak pastures hundreds of bulls roamed, awaiting their day in the Lisbon arena.

Cork Bounces on Air Cushions

At a factory in Seixal, south of Lisbon, I saw cork boiled in vats for an hour. While still wet the strips were set out in the sun to dry for 10 days.

If the cork is one of five acceptable grades, it is boiled for another hour and finally cut into squares. From these, bottle corks are fashioned by machines. I witnessed one process by which blocks were shaved into cigarette tips $1/300$ th of an inch thick.

From fishing-line bobbers to life jackets, cork has hundreds of uses. Resisting heat and cold, it insulates roofs and refrigerators. Cork gaskets seal engine parts against water, oil, and gasoline. Cork assists in sound-proofing. It is so highly compressible that stoppers removed from bottles after 10 years



New Bedford Standard-Times

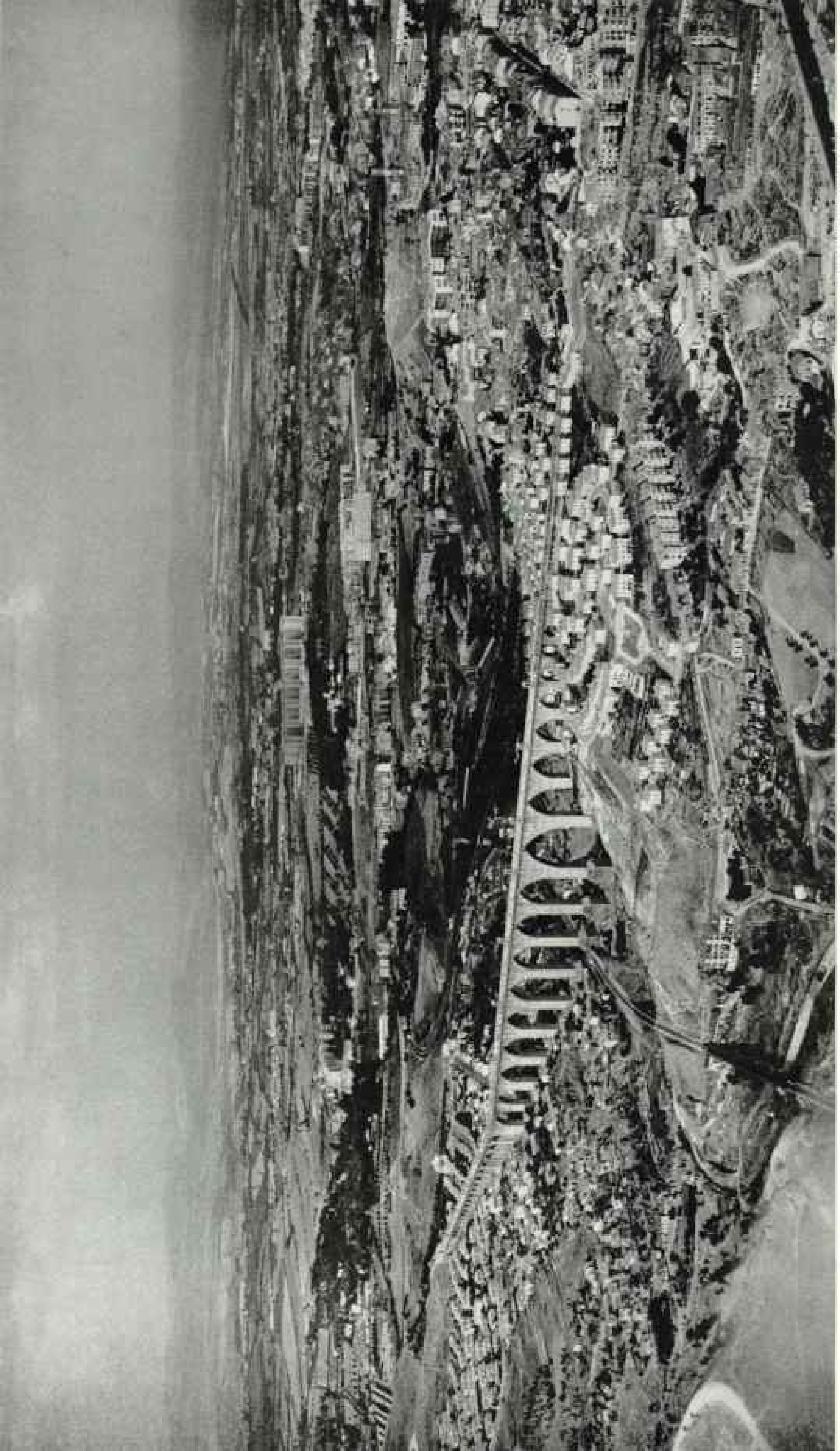
Like a Galleon of Old, *Sagres* Glides Majestically Past Cape Cod under Full Sail

This three-masted, steel-hulled training ship recently carried 310 Portuguese cadets on a tour of eastern United States ports. Each square sail bears the Cross of Christ, emblem of a military order founded in 1318. Prince Henry the Navigator was its grand master. Portuguese sails in the discovery days had the same device.



A Half-moon Fishing Boat with Picture Prow Rides the Surf on Straining Oars. Cable and Hook Await It on Furadouro Beach

For long, barbarous stretches along Portugal's western wall, this antique Phoenician craft is ideally suited. Its peaked prow cleaves the surf when other boats are wave-bound. A cable from the stern, one of a pair, stretches out to a net. Soon, when hitched to these cables will drag in the catch.



Lisbon's Two-century-old Aqueduct Strides Across the Valley of the Alcántara on 200-foot Stilts

Passengers flying over the capital see thousands of new houses and apartments being built. They are priced to be paid off in 20 years. Almost 5 miles from central Lisbon (to the right), this suburban community shows half a dozen new developments. Two gigantic hospitals rise in the distant center.



National Geographic Photographer W. Robert Moses

Lacework in Limestone Is the Cloister of the Monastery of Jeronimos (Jerome) in Belem

The style is Manueline, a late Gothic adorned with Moorish and Indian details. It is named for King Manuel I, the builder. He and his intrepid navigator, Vasco da Gama, are here entombed. No two of the magnificent arches are carved exactly the same. Jeronimos is now a national monument.



The American World Airways

Like a Captured Jungle Monster, a Sardine Trap Goes Ashore on Ten Stout Poles

This huge net, only a fraction of which is shown, was buoyed and anchored across a broad stretch of the Atlantic. Twice daily its catch was collected. Now it faces an overhaul, or perhaps the approach of the autumn storms requires its removal. Sezimbra beach is tented by vacationists; their pleasure craft mingle with the fishing boats. Wide mesh indicates first two men are hauling the net's coarse opening.

have regained 75 percent of their volume.

Cork is composed of millions of tiny cells of cellulose glued together with a natural resin. The fact that more than half of cork's volume is air accounts for its lightness and resilience.

In general, not more than 60 percent of a stripping may be cut into natural cork products. The remainder, odds and ends discarded by cutters, is ground like hamburger and used in composition products.

Évora's Bones "Await Yours"

Évora was my next stop. Near its north gate I encountered earthen wine jars big enough to hide Ali Baba and his 40 Thieves. Six feet high and 12 feet around, they were shaped like ancient Greek and Roman amphorae.

About 75 B. C. Évora prospered as the headquarters of a Roman colony. Later it passed to the Moors. Their architectural style still stamps the city's windows, doors, and chimneys.

Chimneys, each one different, are as large as they are graceful. To an American they look more like towers, pagodas, or extra attic

rooms. Some are shaped like minarets; others resemble tents. To let smoke escape, their sides are slotted, like children's piggy banks, with fanciful squares, rectangles, triangles, or circles. By creating drafts, the chimneys serve to air-condition houses in summer.

While in Évora I lunched in the Hotel Évotense, once headquarters of the Inquisition. Near by is a Roman temple, from the first or second century. In a narrow street stands the house in which Vasco da Gama was married and his children were born.

Évora's mayor guided me through the Church of São Francisco, whose Chapel of Bones is walled with thousands of skulls. A shuddery inscription proclaims, "We bones here wait for yours."

King's Bloody Shirt Hangs in Closet

An equally grisly touch I saw in the palace of Carlos, assassinated King of Portugal, at Vila Viçosa. His bloodstained shirt still hung in a wardrobe. Everywhere, in fact, the palace was maintained exactly as Carlos left it in 1908. Some rooms were decorated with paintings by the King himself.

Next I headed for the Algarve, Portugal's southernmost province. Foreigners seldom visit the Algarve, and guidebooks virtually ignore it; yet the province has its charm. Here the Moorish influence lingers strongest. Moors stamped the province with their language, customs, music, handicrafts, and architecture.

Algarve's very name is from the Arabic: *El Gharb*, Kingdom of the West. The Moors, who overran the province in the eighth century, remained until the 13th, when Crusaders helped the Portuguese to expel them.

The Moorish irrigation system is still used on some small farms. Water is drawn from an Arabian-style well by a *nora*, an intricate set of wheels and revolving buckets. A blindfolded ox or donkey plodding in a circle provides the power.

As the Algarve lacks rain in summer, all vegetation but trees turns brown. Spring brings a magnificent display of almond blossoms. Then the people delight in retelling the tale of the Norwegian princess wed to a Moorish prince.

On her first winter in the south, according to the story, the bride pined for the sight of snow. As spring arrived, the prince promised her that when she awoke again she should look out on a beautiful white landscape. Next morning she rushed to her window. The almond trees had burst into bloom! Prince and princess lived happily ever after.

Whistling Pots Ride Windmill Wheels

I arrived too late to see the almond blossoms, but I could not escape the huge windmills, each bearing sails as white as a ship's canvas. They crown almost every hilltop.

I never was able to see how Don Quixote fought a windmill until I examined one in the Algarve. Thirty-foot wheels with revolving sails almost scraping the ground—an easy target for the Don's lance (page 585).

I found the wheel rims fitted with small clay pots, all facing the same direction. They seemed to have no logical purpose. A miller, however, told me he had placed pots on his wheel because of their odd whistling effect. He could be off in his fields and, if the whis-

ting ceased, he knew the wheel no longer faced the wind and he must reset it.

Here in the hot south both sexes wear the masculine black felt hat. It supports a faded neckcloth to prevent sunstroke. As an added precaution, the people carry big black parasols. Watch them as they ride their burros and horses; wherever possible they stay in the shade. A canopy shields the typical two-wheeled cart; another canvas blankets the horse. Harness is gay with red tassels, tinkling bells, and fly-chasing mirrors.

I toured the south coast briefly.

In Praia da Rocha I was held spellbound by a sight of the town jail. Apparently there were no guards. In their stead, friends of the inmates loitered outside windows. Iron bars were fully six inches apart. Anything could have been handed through for a jailbreak, but who wanted to make the effort?

Prince Henry's Golden Dreams

At Sagres I inspected Fortaleza, where Prince Henry established his school for navigators. Picture of impregnability, the fort sits on a cliff. From this vicinity some of the great caravels of discovery sailed into uncharted seas.

Prince Henry, who dreamed of Portugal's greatness, was never the master nor even the partner in any voyage of discovery. He gained his title, the Navigator, because he encouraged so many ocean expeditions. Dying in 1460, he was buried in Batalha, Portugal's Battle Abbey (page 593).

In Fortaleza's courtyard I saw the white stones which Prince Henry set out to illustrate compass points.

I stood on a parapet and gazed at rocky Cape St. Vincent (Cabo de São Vicente) Europe's southwestern tip.

Here the seekers of *Ultima Thule* said goodbye to the continent.

As the sun sank into the sea, darksome mists swirled around the cape. My voyage of discovery to the land of the discoverers came to its end.*

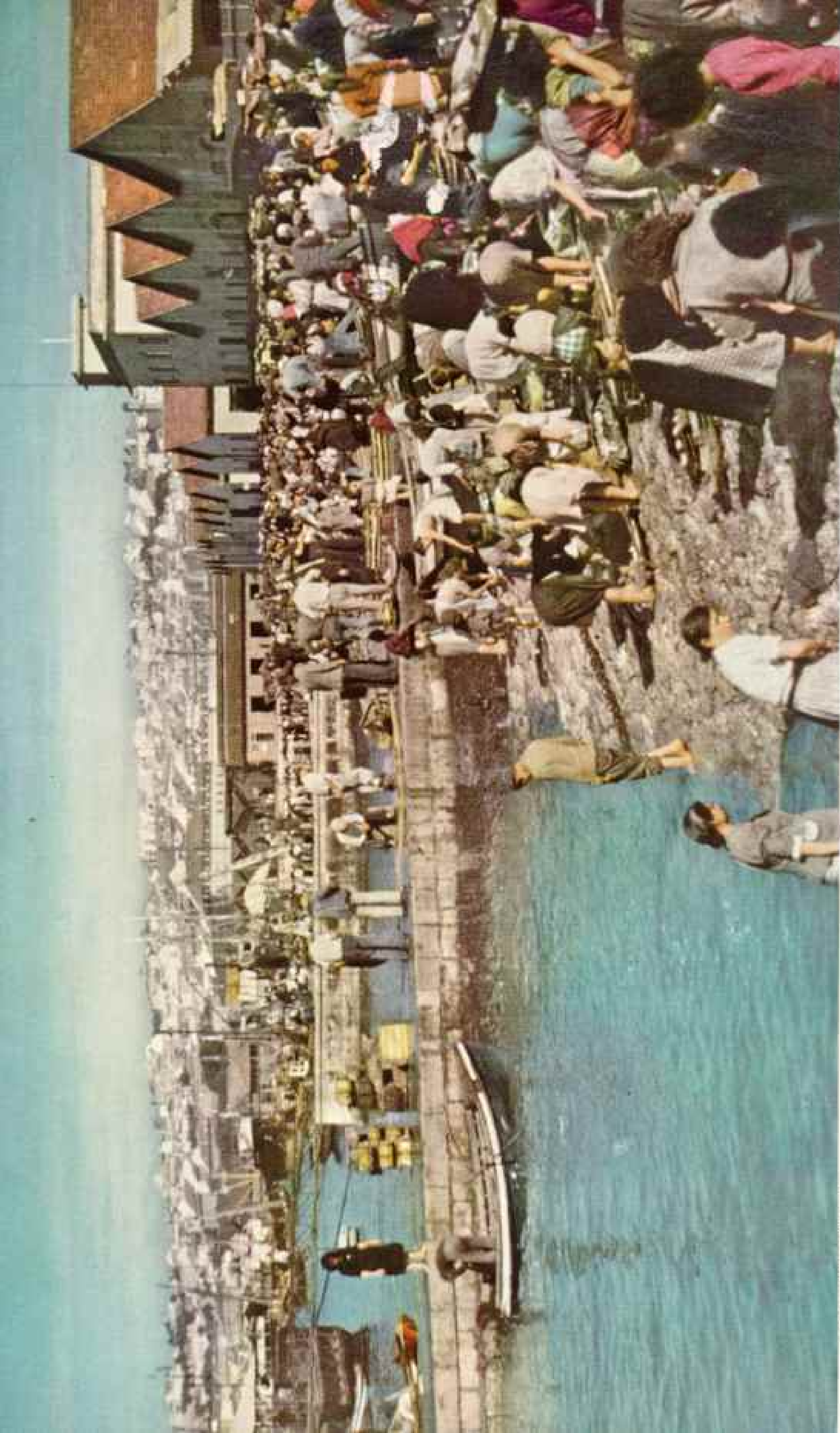
* See "Altitudinal Journey Through Portugal," by Harriet Chalmers Adams, NATIONAL GEOGRAPHIC MAGAZINE, November, 1927.

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Sand Carrier, Feeding a Cement Mixer, Juggles a 3-gallon Hat on Nazaré Beach

Many Portuguese women carry big loads on their heads. Few in farm or sand-dune fishing villages are accustomed to shoes. In Nazaré (Portuguese for Nazareth) tartan dresses and trousers suggest Scotland.



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Illustration by Clement B. Cramer

Lisbon's Shouting Fishwives Mob the Tagus (Tejo) Docks by the Thousands. "Every Fishy Cargo Precipitates a Buyers' Riot. In the river each one cleans her fish. She helps her competitors hoist dripping head-borne trays for door-to-door sales. Shriek cries advertise their wares.

Lisbon Law Says These Women Must Not Go Barefoot

Each has shoes cached near by. Let a policeman appear, she's shod in a jiffy.

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Delicately She Waves a Dainty Sardine in Either Fist

Compared with women, a tornado of activity, fishermen seem wax dummiess.

Photographs by Clément E. Gurney





Steepled Prows Proclaim the Phoenician Ancestry of the Fishing Fleet Beached Beneath Nazare's 360-foot Cliff
Nazare has no harbor. Men and even, straining against the sand, launch its small craft. To cleave the surf, prows curve up like scimitars.

Shouts and Odors Assault the Atmosphere in Porto Market. Visitors Run a Fishwives' Noisy Gantlet

Look at these faces! They are a compound of Celtic Iberians, invading Phoenicians, Visigoths, and others. In the south, Moorish strains appear. Imperial Rome called its Portuguese colony Lusitania and gave the people their language.

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In Nazaré a Clown's Baggy Trousers Are Serious Garb Indeed. Fishermen's Tartans Shriek with Checks, Some a Foot Square

Atlantic's bountiful fish crops give most Portuguese their daily protein. Meat is reserved for festivals and weddings.

◀Mother Parks Baby on Nazaré Beach and Shells Corn

Delicate is she compared with most Nazarene wives. Time was when they trudged barefoot across miles of sand, each one with a 40-pound basket of fish on her head. Now trucks haul fishwives to market.

Baby is here bundled up in midsummer as protection against the cool Atlantic breeze.

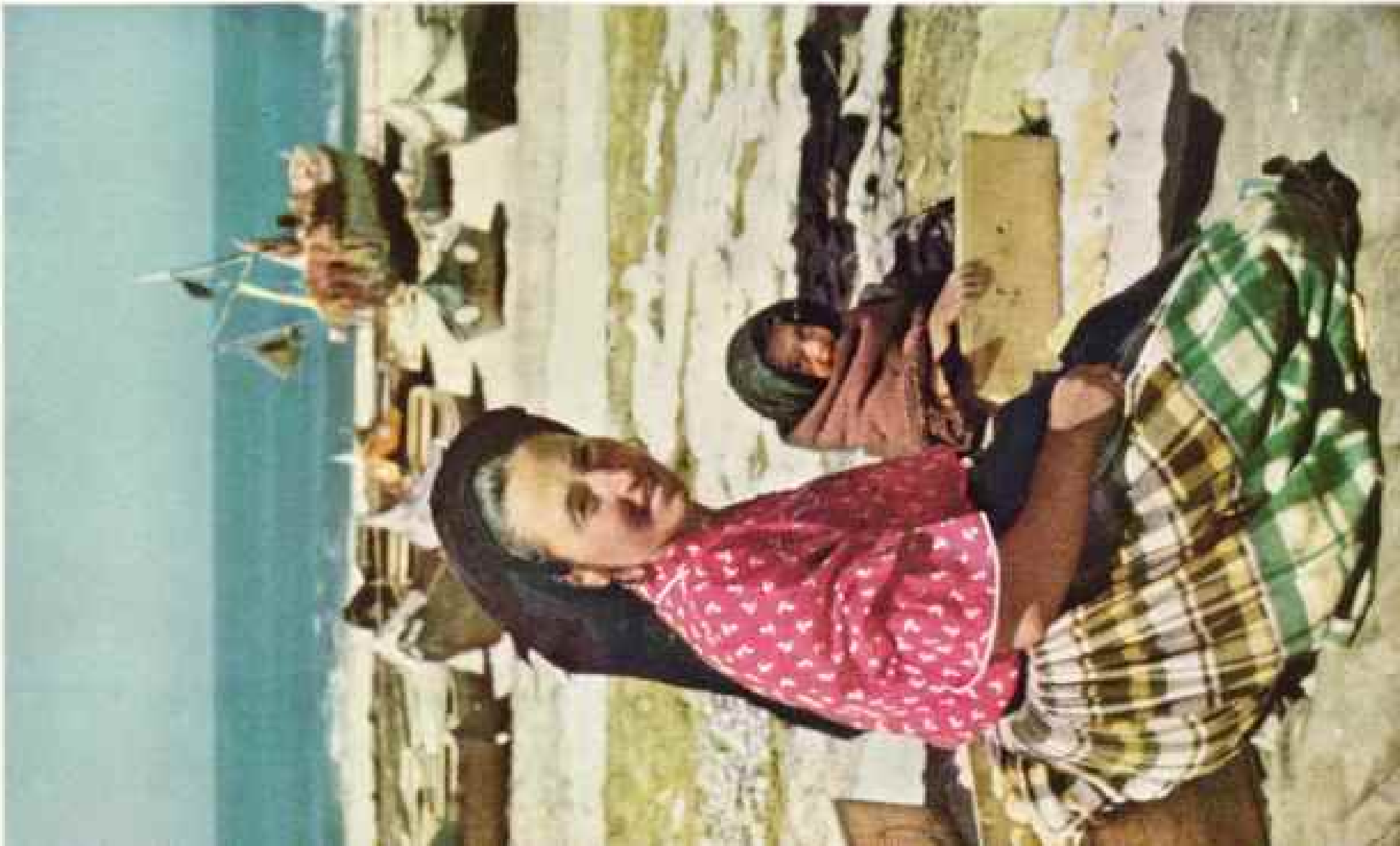
▶ A Fisherman Wears Fashion's Bulging Santa Claus Cap

As Portuguese as port wine is the native cork, here used as a net's floats. Stringing his corks, the fisherman snubs the line with a bare toe. Checked underwear peeps from his pantaloons. In the tassel of his cap he banks money and tobacco.

The stocking cap, called *carapuca*, is the style north of Lisbon. In the south men wear buttered felts.

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Contributed by Clement B. Cooper





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Illustrations by Clarence E. Green

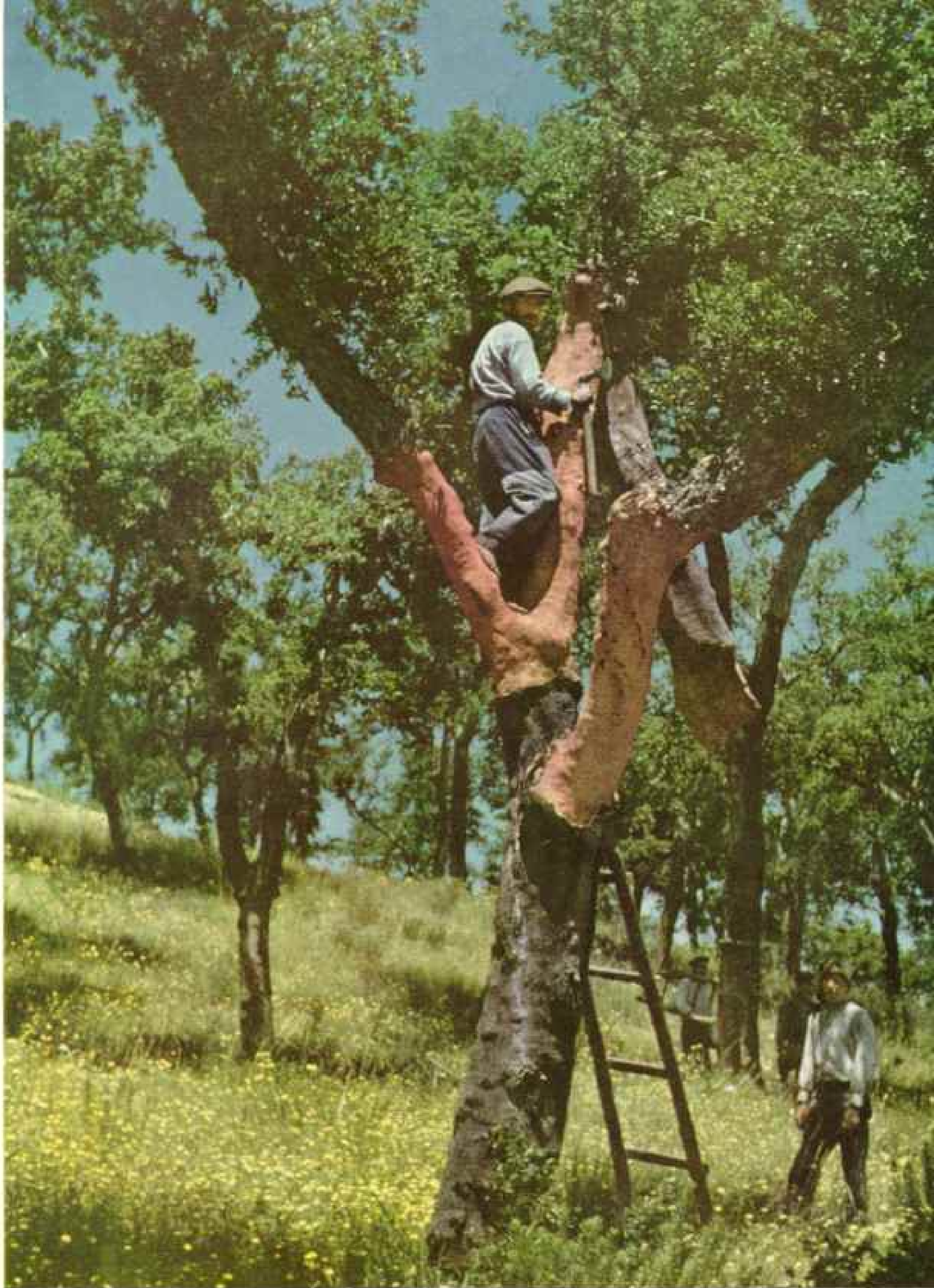
★A Fisherman Touches Up the Geometric Eyes on His Wooden-headed Boat

Other Portuguese adorn their craft with goats' horns, mermaids, and eyes to "look for fish." Saints and miracles are equally popular. This beach is part of Vila Real de Santo António. Spain lies across the Guadiana.

✧Nazaré's Floats, Lines, and Sinkers Dangle Like Monday Morning's Wash

Some Nazarenes journey with the Portuguese fishing fleet to the Grand Banks. There they may meet New England Portuguese such as Manuel, hero of Kipling's *Captain Courageous*. Manuel lived in Gloucester.





Cork Oak, Stripped of Its Bark Cloak, Blushes Pink: Alentejo Provinces

Cork, dead outer bark of an evergreen oak, weighs a fourth as much as water. Air inflates its cells like tiny balloons. Portugal strips the trees, according to law, not oftener than once every nine years.



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Illustration by Elizabeth E. Dwyer

A "Staggering" Load of Raw Cork Is So Light It Has To Be Tied Down Lest It Blow Off the Wagon

Resilient, heat-resisting, and sound-absorbing, cork has hundreds of uses. Cork shoes, stoppers, and floats were known 2,000 years ago.

Grapes in the Air, Grain on the Ground Grow on the Same Soil North of Porto

Portugal's common wines are made just as the Romans directed 2,000 years ago. Many vines are trained to trees or trellises, as in ancient Italy.

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← **Bussaco, Once the Home
of Kings, Now Lodges
Any with the Price**

Centuries ago this property was acquired by a group of monks for the establishment of a "desert house" where they might meditate. They planted the surrounding park with exotic trees brought back from the tropics by the early navigators. Giant cedars, lofty eucalyptus, and magnificent tree ferns abound.

In the last century the monkish order was dissolved and a royal summer residence built at Bussaco. When Portugal expelled the last of her kings, their villa became a resort hotel.

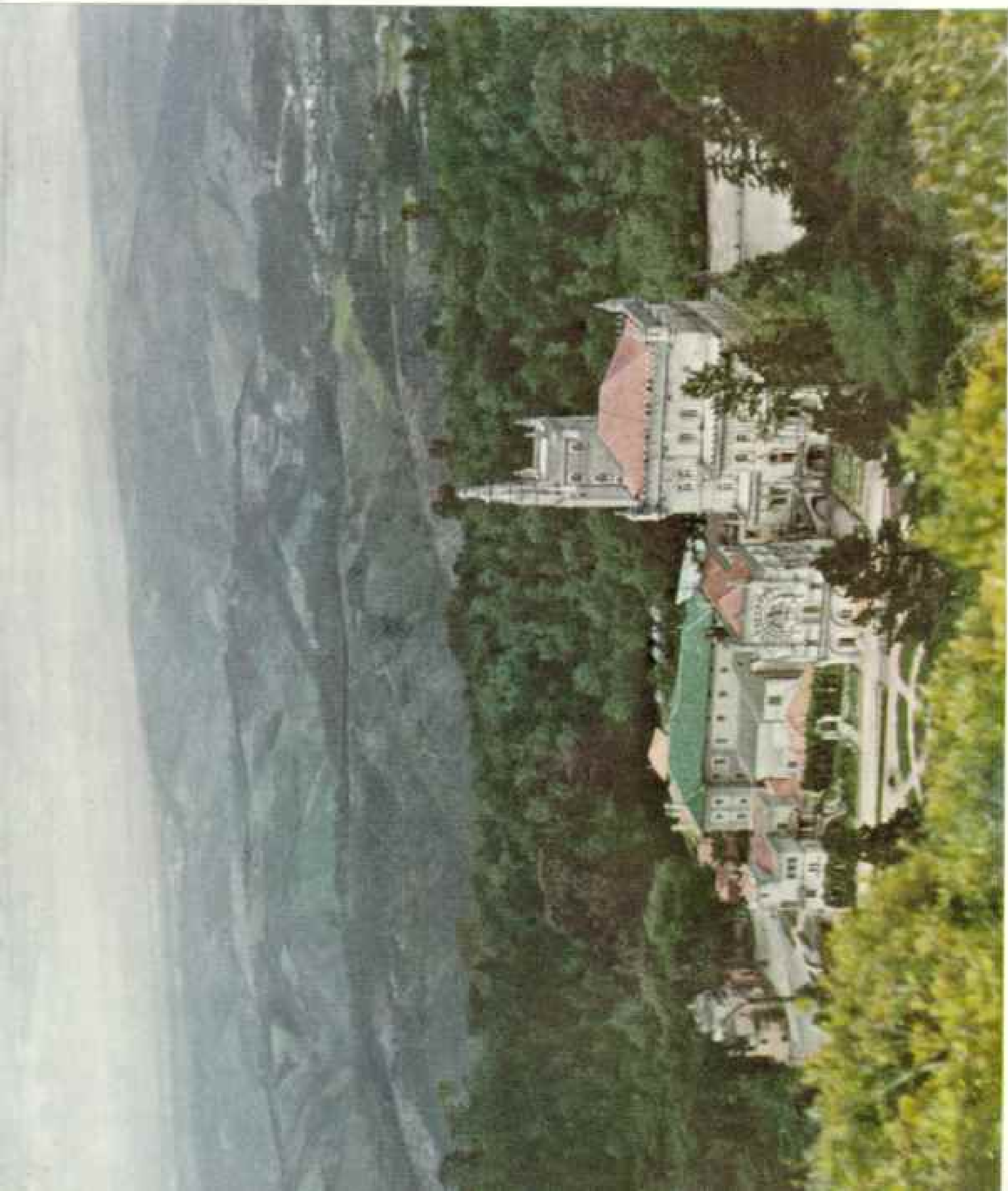
On what Sir Walter Scott called "grim Bussaco's iron ridge" Wellington defeated a Napoleonic army in 1810.

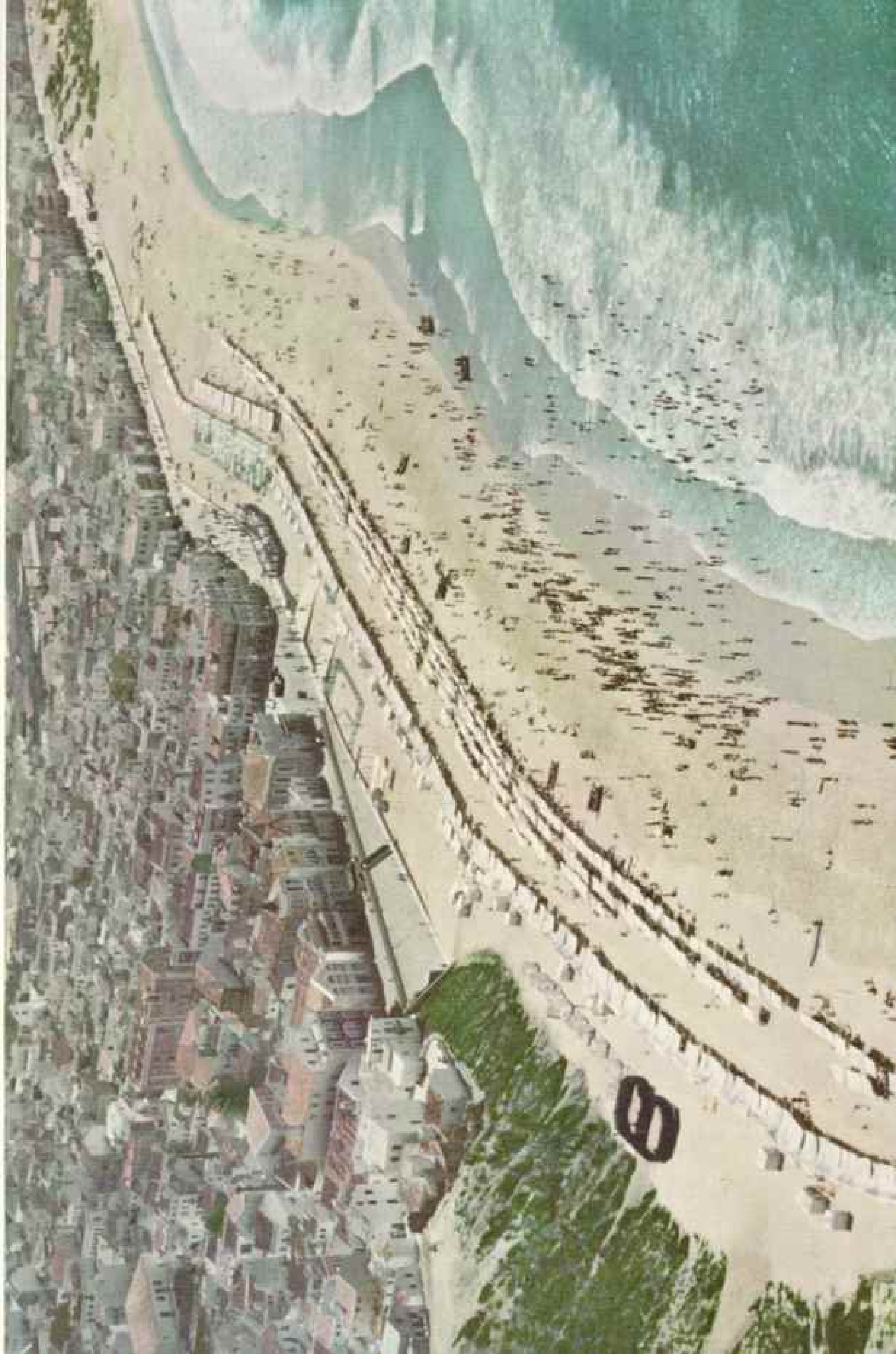
↑ **Nazaré's Beach Tents
Stretch Like Laundry;
Bathers Bob in Surf**

Nazaré is a fashionable resort as well as a fishermen's village. In summer poorer residents lease their homes to vacationists and spend the season camping on the beach (extreme right). The picture was taken from the immense bluff overlooking the town (page 610). On it stands a shrine to Our Lady of Nazareth. Legend says it was erected by a knight whose plunging steed was halted miraculously at the brink.

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Illustrations by Clarence E. Casper







A Barge-cannoe, Longer than Two Trucks, Discharges Firewood on a Watery Street in Aveiro

Canalboats stealing out of this little Venice seem to skim across flat fields. Some are piled high, like wagons, with green hay. Others carry salt evaporated from sea water.

Blankets Leap Alleys, Walls Are Festooned with Laundry in Lisbon Slums

This is Alfama, anciently the Moorish section of the capital. Here and there are Moorish-built homes and the ruins of Roman walls.

Decaying tile roofs grow green carpets of moss and furrows of grass, but a summer's drought turns them yellow.

Backbreaking streets climb Alfama's precipitous hill in staircase fashion. Gloomy chamas pass for alleys; outstretched hands can touch the walls on either side.

A gallery of laundry may be seen waving in the Alfama breeze any hour of the day. Colors of fish, green wine, and burning brush assail the passer-by.

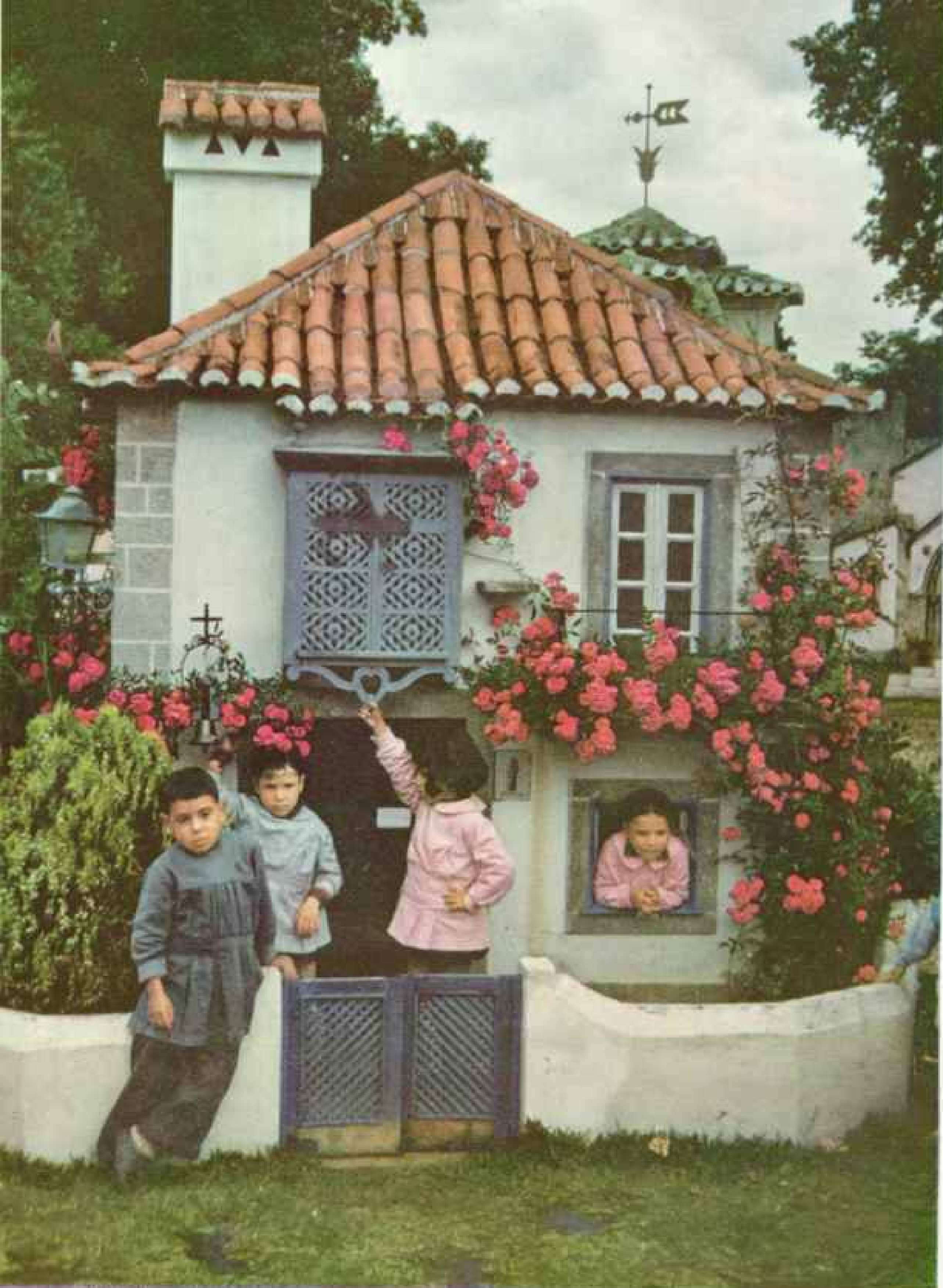
Few of the houses have electricity or running water. Wives carrying water jars go to community wells several times a day.

Only at midday does the sun peep into the bottom of Alfama's canyons. This comparative boulevard was chosen for a picture because it allowed a rare glimpse of light.

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Reproduction by Christy E. Cooney





Toy Town's Rose-trimmed Dollhouses Transport Portuguese Children to Fairyland
Children's Park, Coimbra, covers an acre with 30 Lilliputian cottages, fairy castles, and cathedrals. Miniature streets have tiny gates, fences, and lampposts. Statues are carved to scale.

The Purple Land of Uruguay

BY LUIS MARDEN

With Illustrations from Photographs by the Author

SOME three-quarters of a century ago, W. H. Hudson rode the rolling plains of Uruguay and later described them in his unforgettable novel *The Purple Land*.

The Uruguay he saw was a trackless and fenceless land of cattle ranches. Vast *estancias* receded into the purple land of distance. Today, this smallest republic of South America has become the most densely populated. Yet the traveler can still ride for miles in the interior without seeing a house or a human being.

Smaller ranches predominate now, though there are plenty of big ones left. Agriculture grows increasingly important, but 80 percent of the land is still given over to the cattle industry.

A professor of geography at the University of Uruguay told me:

"Don't forget, our smallness is in great part relative. You could put Belgium, the Netherlands, Denmark, and Switzerland inside Uruguay and still have plenty of room left over. We look small on the map because maps of this hemisphere use a smaller scale than those of Europe, and also because of our tremendous neighbors."

Two Great River Systems

South of the Amazon Basin, the green continent of South America swings inward from the Atlantic and spills its water mainly into two great river systems: the Paraná-Paraguay and the Uruguay.

Winding southward for more than a thousand miles, the brown and blue waters drain half a continent and rush together at last to emerge, wide and red, as the Río de la Plata—river, bay, or estuary—the geographers are still arguing about it (map, page 625).

On the left bank of the Plata lies the heart-shaped Republic of Uruguay, neatly spanning five degrees of latitude on the map. From its position the country was long called the Banda Oriental—the Eastern Shore of the Río de la Plata. Even today Uruguayans like to be called Orientales.

The little country on the Plata has been a leader in broadening educational opportunity. All schooling is free, and a Uruguayan citizen may progress from primary grades to a university degree without spending a cent, even for books.

Uruguay enacted the first 8-hour day in

South America during World War I. Old-age pensions were established later. The State also issues insurance and operates the railroads.

In addition to private broadcasting stations, a Government transmitter in Montevideo plays popular and serious music almost continuously, without commercials. Thus the listener may choose between Beethoven and an ode to hair tonic.

One night I sat on the terrace of a Montevideo club with my geographer friend, Prof. Juan Lagomarsino. Across the indentation of the city's harbor we could see the low outline of the hill that gives the capital its name.

Only 450 feet high, El Cerro, the Hill, looks much higher in this flat region and must have been a prominent landmark when, in 1520, according to the story, one of Magellan's sailors first cried, "I see a hill!" (*Monte vid' eu*). (Page 654.)

Paris, not New York, was the model for Montevideo. From the roof terrace we looked down on the spacious avenues and palm-shaded squares of the capital (page 631). Sidewalk cafes line the main thoroughfare, Eighteenth of July Avenue, and many statues and public monuments increase the resemblance to the French capital.

Though tall office and apartment buildings rise above the downtown area, most buildings in this city of 800,000 are low, and we could see over them to the broad muddy background of the Río de la Plata. The "unlovely red billows" of the Plata have the quick, restless chop of enclosed waters, rather than the slow swell of the open sea.

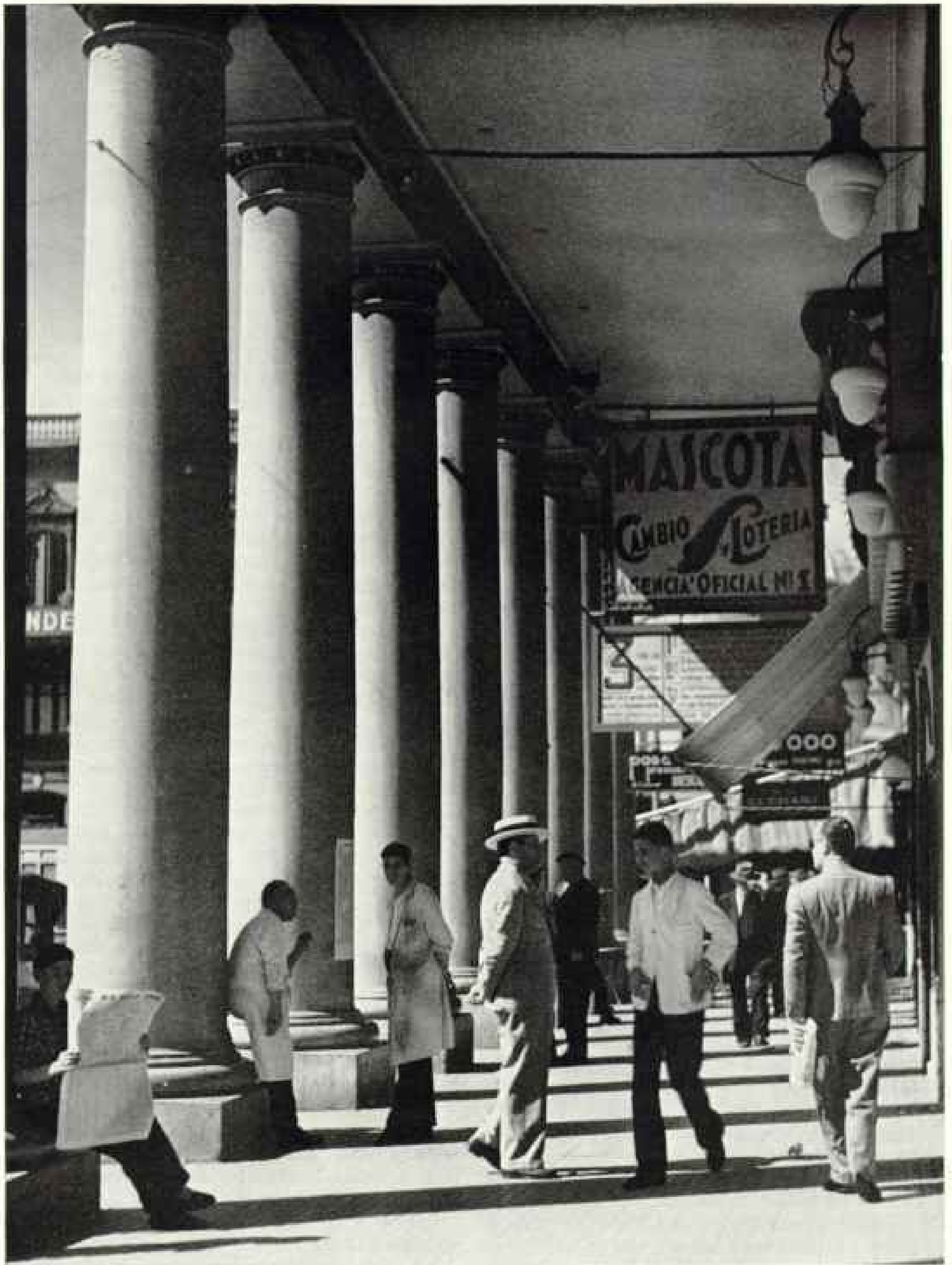
What Is the Río de la Plata?

As we sat over coffee I asked, "Well, Professor, what is it? Bay, estuary, or river?" I had always called the Plata an estuary.

The Professor's face lighted up. "Ah, that is the question. It fulfills some of the conditions of each. According to international law, it is a river; rivers of course belong to the countries on their banks.

"If it is a river, then it is the world's widest—137 miles."

Sketching rapidly in my notebook, the Professor continued: "At first glance, you might think it an estuary; but it does not fulfill all the requirements of an estuary to the exact geographer."



National Geographic Photographer *Maynard Owen Williams*

When Sun or Rain Beats on Montevideo, Pedestrians Use the Sidewalk Arcades

This gallery is one of those surrounding Independence Plaza. Leisurely coffee drinkers frequent the sidewalk cafes in the plaza's corners. *Cambio y Loteria* changes money and sells official lottery tickets. The next drawing's winning number will be posted overhead where the ciphers now hang.



Drawn by H. E. Eastwood and Irvin E. Athman

North Dakota-sized Uruguay Is Squeezed Between Giant Argentina and Brazil

With her neighbor to the left, Uruguay shares the Rio de la Plata, on which they have built their capitals, Buenos Aires and Montevideo, 125 miles apart. Only recent maps show the huge lake formed by the new dam and hydroelectric project on the Rio Negro (pages 634 and 646).

"The discoverer, Juan Diaz de Solis, in 1516, called it the Mar Dulce—Freshwater Sea; not a bad description.

"So much silt has been carried out of the heart of the continent by the two great rivers that there is a coating of fine ooze 30 feet deep on the bottom of the Plata.

"Ships with a water intake on the bottom cannot enter because of this, and often vessels run aground, slowly and insensibly coming to a stop, until the next tide floats them again."

Winds Affect Plata More than Tides

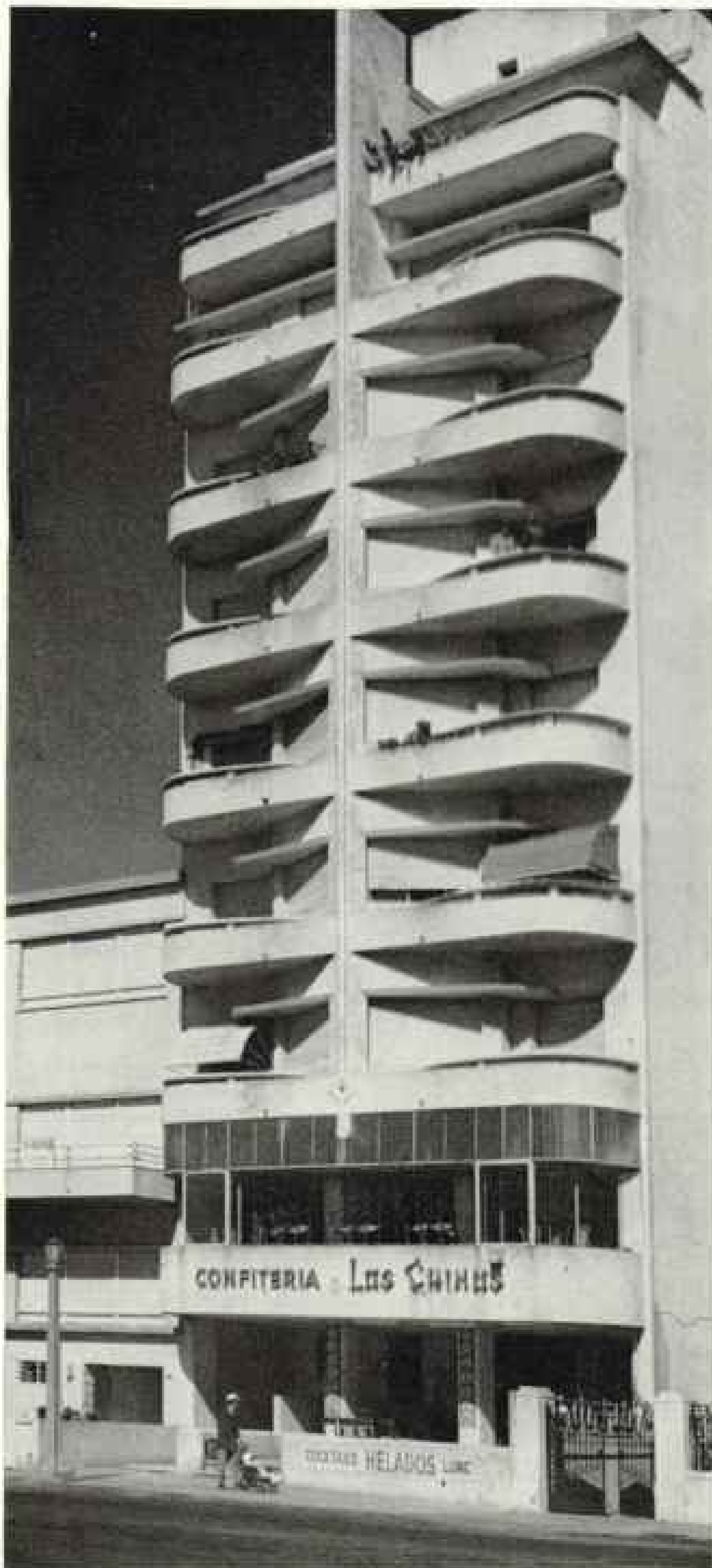
Tides are not strong in the Plata, usually making a difference of little more than three

feet. Winds influence the level much more; strong winds, particularly the *pampero*, blowing from the southwest, may raise or lower the level double that amount.

Winds affect the Plata's salinity too. Sometimes it is nearly fresh; then the wind shifts, and it becomes nearly as salty as the sea.

I have seen the Argentine coast at Buenos Aires, 125 miles upstream from Montevideo, one bare mud flat as far as the eye could reach. The wind had blown the Plata completely out of sight!

The sun sank as we rose to leave, and from the dark bulk of the Hill a lighthouse blinked against a salmon-colored sky.



Arthur J. O. Rumors

Modern Is the Word for This Soda Bar-Apartment House

Confiteria comes from *confite* (bonbon); this place at Pocitos Beach, near Montevideo, sells sodas, drinks, and food. *Cocktails*, *helados* (ice cream), *lunch* are good Uruguayan words.

Years ago, cattle in Uruguay were bred for hides and horns. Today, hides are still important, but cattle produce for export chiefly beef—chilled, frozen, tinned, and in extract.

The tough old gauchos would be horrified to know that sheep now outnumber cows three to one (pages 645, 651).

Three huge main packing plants prepare beef and mutton for market. One, nationalized, sells meat domestically as well as abroad; the others pack mainly for export. When the American housewife buys a can of corned beef, she may often find upon looking at the label that it comes from Uruguay (page 649).

But to savor the national product at its best, the epicure should eat it in one of the many *parillas*, or grills, that cast a friendly light on the nocturnal pavements of Montevideo.

Toward the back, a big grate leans over glowing charcoal. On the tilted rack, steaks as thick as they are broad drip juice until the embers pop and hiss. White-hatted chefs turn the cuts lovingly and, at the precise moment, flip them off on to the diner's plate.

The succulent steak, a heaping green salad, and a bottle of red wine of the house—it is enough to make a poet of a wooden Indian.

Orientales dine late, often not until 10 or 11. The day I arrived in Montevideo I was invited to dinner by two Uruguayans whom I had met on the airplane en route from Miami to Rio.

At an outdoor restaurant on the outskirts of the capital we sat at tables under a roof of thatch.

In stalls along the wall of the courtyard, men in baggy trousers barbecued beef and kid on long swordlike skewers stuck into the ground at an angle over charcoal fires.

While the juicy cuts were



To Tighten a Drum, Build a Fire and Heat the Drumhead

At Carnival time mummers roam Montevideo's streets, dancing for coins to the offbeat rhythm of drums. Lacking drawstrings or other stretching devices, they heat their drumheads over paper fires to raise the tone.

being served, one of my hosts prepared to mix the salad.

"I'll tell you my formula for good salad," he said, expertly wielding bottles and shakers. "You must use salt like a wise man, oil like a spendthrift, vinegar like a miser, and then mix like a madman."

First- and second-generation Spaniards and Italians form large elements of Montevideo's and Uruguay's population. Almost every quarter of the city has its Italian-style *pizzeria*, cafes and grills which serve *pizza*, the hot Italian tomato pie. A generous wedge costs three cents.

Italian surnames occur commonly in the Republic, particularly around Salto in the northwest. In fact, Italians are so numerous in the Río de la Plata area that the Spanish of the region has acquired an Italian cadence and lilt.

But whether Spanish, Italian, or *criollo* (person of Spanish ancestry born in America), the numerous cafes of the capital

give a friendly, convivial air to the city.

Men sit inside or at tables on the sidewalk and consume *café expreso*, strong black coffee in little cups, as they discuss politics, letters, and the arts.

Típica orchestras play in the larger cafes. These consist of piano, violin, bass viol, and two or three *bandoneones*, the concertina that is the typical voice of the tango.

More nearly square than an accordion, a *bandoneón* has two sets of push buttons and no piano keyboard. It has a mellower, rounder tone, less shrill than that of the accordion.

Típicas play chiefly tangos, waltzes, and *milongas*, a faster, jumpier version of the tango.

Uruguay's Tango

Though the tango was born in Buenos Aires, the best-known tango, "La Cumparsita," is Uruguayan. The late Gerardo Matos Rodríguez composed the classic when he was still a



Uruguay Tourist Commission

Santa Teresa Fortress, a Five-pointed Hedgehog, Forms an 18th-century Pentagon

Portuguese started the fortress in 1767. Spaniards captured it the same year and completed the job in the fashion of Vauban, the French fortification genius of the time of Louis XIV. Once abandoned and quarried for building stones, the old fortress now forms the nucleus of a Uruguayan national park close to the Brazilian border (pages 630 and 643).

youth and lived to see it played round the world.

In the back rooms of many cafes convene groups that meet informally for mutual entertainment. In one cafe I heard a Uruguayan pianist, a Brazilian soprano, and an Argentine tenor.

There is another Uruguay, undreamed of in Hudson's day: the summer-colony Uruguay of white beaches that stretch in a nearly unbroken chain from Montevideo to the Brazilian frontier, about 200 miles.

Tourism Nation's Second Industry

Bolstered chiefly by a spate of Argentines from nearly beachless Buenos Aires, tourist trade has grown into the Republic's second industry. Last year visitors spent more than \$25,000,000; only wool and meat bring more into the country.

A map published by the Uruguay Tourist

Commission shows more than fifty beaches along the Uruguayan Riviera. The Rambla, a wide boulevard named in sections for various countries and their patriots, connects many of the beaches near the capital. These range from the popular inexpensive resorts to the glitter and formality of Carrasco's twin-towered hotel and Casino (pages 647, 648).

Beaches near the capital show the red-tinged half-fresh water of the Río de la Plata. Eastward along the coast, the water becomes clearer and saltier until at Punta del Este the open blue Atlantic breaks in heavy surf against the promontory.

The inner sheltered beach at Punta del Este is called *Playa Mansa*, Tame Beach; the heavy surf on the east side earns it the title of *Playa Brava*, Rough Beach. Swimmers may suit abilities or mood.

Off Punta del Este lies the small rocky Isla de Lobos, home of one of the two most



White Sails Frame the Tower of the Uruguay Yacht Club: Buceo

From the landward side the club's façade resembles a ship's cutwater, and the jutting balconies look like a liner's multiple decks.

important colonies of fur seals in the Southern Hemisphere. From Lobos the coast's most powerful lighthouse marks the entrance to the Plata with a flashing finger of light.

On December 13, 1939, the hundreds of fur seals and few sea elephants that inhabit Lobos must have seen the red flashes and heard the distant thunder of the naval engagement between the German pocket battleship *Admiral Graf Spee* and the British cruisers *Ajax*, *Achilles*, and *Exeter*.

The wreck of the *Graf Spee* still lies where she was scuttled in shallow water off Montevideo. With Prof. Juan Lagomarsino I sailed to the wreck one evening from the Uruguay Yacht Club, a tall white building with balconies like a bridge and a profile like the cutwater of a ship.

Uruguayans Love Yachting

With more than half their national boundary made up of navigable coastline, the Orientales are seagoing people. Ardent yachtsmen

race their vessels up and down the coast and compete in international regattas, some as grueling as the Rio de Janeiro-Buenos Aires run.

Don Juan was the only Uruguayan to beat Argentina in an international race. He is one of the country's leading yachtsmen, as well as a geography professor.

"My friend Pepe Gaínza will lend us his schooner for the run," he had said. "He and I limp on the same foot"—a way of saying "we have the same hobby."

As we sailed toward Montevideo from the little port of Buceo, we saw the black outline of a freighter, immobile as if nailed to the orange sky. A small pilot boat scuttled about like a water bug.

Suddenly the freighter gave three short blasts on her deep-toned whistle; milky water churned up at her stern and she moved slowly off, laying a scalloped cloud of black smoke along the horizon.

Pointing, Don Juan asked, "See that last

buoy flashing off there to the left? We call that the Buoy of the Good Voyage. It's the last you see as you leave these shores.

"That reminds me," he went on, "I must telephone to find out the arrival time of a ship when we get ashore."

"Do you call the lookout on the Hill?" I asked.

"No, I'll dial 213, and the operator will tell me."

"You mean 'information' lists ship schedules?"

"Oh, yes," said the professor. "And not only ships. This number tells you arrivals and departures of trains, airplanes, and buses; what drugstore is open in your neighborhood at night; notices of sports events; the weather; and what is showing at the local movie. If you hear a fire siren, 213 will tell you where the fire is!"

Later I learned of other services furnished Uruguayan telephone subscribers at no extra charge. A special operator on 214 answers the subscriber's telephone while he is on vacation, takes all messages, and refers callers to his new address. The same operator will also wake up patrons in the morning!

In a light breeze we sailed round the point and past Montevideo. Through glasses we could make out the white curl of breakers over the low-lying wreck. Slowly we drew near to all that is left of the *Graf Spee*.

Almost awash, the rusty hulk lies canted over, one gun still pointing to the sky. Seas swell and break over the wreck, dropping away to reveal the gaping black ports which an instant later spout fifty simultaneous jets of white water.

As we circled and started back to Buceo in the gathering darkness, Don Juan said: "For days after they blew her up, I could see the red glow from my apartment window. Shortly after the scuttling, divers salvaged guns, samples of armor plate and equipment, and sent them to England for study.

"A sand bank is slowly forming around her now; I suppose it will eventually bury her."

Santa Teresa National Park

Beyond Montevideo the sandy coast, dotted with tidal lagoons, runs to Brazil.

Almost at this frontier, the ruins of a big fortress mark the old division between the lands of Portugal and Spain.

In 1750 a treaty signed in Paris advanced the line of Portuguese possessions in Brazil farther to the south. To defend the new border, Portugal began to build Santa Teresa Fortress.

Designed in the style of Vauban, celebrated French military engineer, the star-shaped fortress was captured by the Spaniards, who redesigned and enlarged it.

Later the fortress was taken and lost successively by the Portuguese, Spaniards, Brazilians, and Uruguayan patriots before it fell finally to the newly constituted Republic of Uruguay (pages 628 and 643).

Spanish and Portuguese possessions changed hands rapidly in those days. The Director of National Parks, Don Horacio Arredondo, with whom I drove to the fortress, said, "The Spaniards won the fights, and the Portuguese gained the diplomatic victories."

Don Horacio first proposed the restoration of the historic redoubt after World War I. Now a rebuilt Santa Teresa forms the center of a magnificent national park, with forests, bathing beaches, camp sites, flower gardens, and a zoological park.

The Highest Point in Uruguay

As we drove eastward out of Montevideo, the country grew more rolling until, near Piriápolis, we saw the highest point in Uruguay, the Cerro de las Ánimas, 1,644 feet.

Near Santa Teresa isolated clumps of feathery palms appeared in the fields. Soon they closed ranks and became a solid forest.

"We do all we can to preserve the palms," said my companion. "Unfortunately, cows eat the young plants and shoots, and since cattle were introduced into Uruguay in large numbers no young palms have grown up."

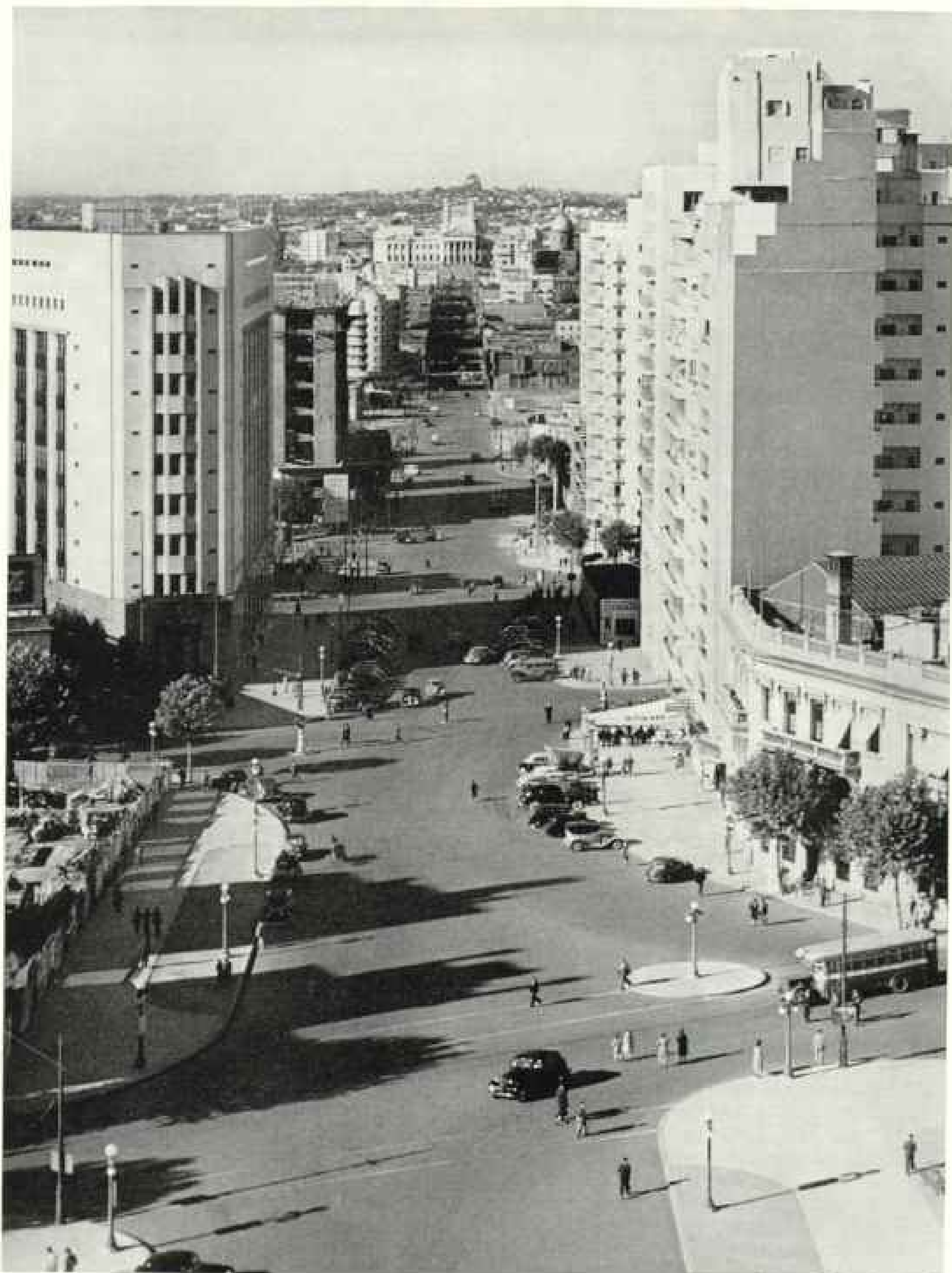
The stately trees are long-lived, but local people frequently defy the law by cutting them down to make palm honey. Felling the tree, they lop off the top and lay the trunk on an incline, top down.

Boiling off the water from the sap that drains out, they get a little more than two quarts of honey in return for the sacrifice of a whole tree.

Santa Teresa stands on an eminence, in an ideal position for defense. Sand dunes and beaches lie before it, and behind stretches the sedgy expanse of the Bañado de Santa Teresa, an area of marsh and inundated land. A shallow tidal lake, one of several along the coast, guards the southwestern flank.

About the middle of the last century the fortress was totally abandoned. Sand dunes moved slowly toward the walls and people took stone from the ramparts to use in building. The dunes had to be anchored with grass and the walls restored.

When the grass had halted the march of the dunes, planners planted shrubs, then trees, literally by the millions, among them 70 kinds



Uruguay Tourist Commission

Uruguay's Classic Capitol Rises at the End of a Broad Montevideo Avenue

Avenida Agraciada has recently been widened and beautified. Big banks and office buildings have made it their home. The second building to the right houses the American Embassy and consulate. Traffic, which a few years ago went to the left, now runs to the right.

of eucalyptus and 27 varieties of palm. Groves of pines grow close to the beaches.

As we walked through the cropped grass of the gently rolling pastures, fat red contented cows regarded us thoughtfully. Teruteros, a kind of plover (*Belonopterus chilensis*), started into flight.

Little burrowing owls sat on the ground and stared at us in the blazing sunlight. Overhead, caranchos wheeled.

The carancho, a species of caracara (*Polyborus plancus*), is an undecided bird; it could not make up its mind whether it wanted to be an eagle or a vulture. It kills live prey, but lives mainly on carrion. Ornithologists call it an aberrant falcon.

Feather Dusters of Ostrich Plumes

I noticed something moving in the tall grass. It looked like a row of upended golf clubs slowly moving along. The golf sticks emerged as long-necked ostriches (*Rhea americana*) and stalked sedately about.

Smaller than the true African ostrich, the rhea lacks the beautiful tail plumes of the larger bird. Ignominiously, the rhea's tail feathers are used to make feather dusters.

Gauchos used to hunt the ostrich with *bolcadoras*, the Indian weapon made by tying two or three stone balls to connected leather thongs (page 639). The horseman whirled them around his head and let fly at the legs of the quarry—ostrich, cow, or man. They wrapped themselves tightly around anything they struck and brought it down.*

So fiercely did the original inhabitants of Uruguay fight the European settlers that today not a pure-blooded Indian remains. Particularly ferocious were the Charrúas, whose last survivors were sent to Paris in 1832 and 1833 as subjects for ethnographical studies.

From the edge of the dunes we looked down on the white sand beach that runs without a break to the Brazilian line. Fishermen with long rods cast into the surf for giant rays.

Farthest North for Penguins

"Sometimes, in the spring," my host said, "the current that sweeps north from Cape Horn and the Antarctic Continent brings hundreds of penguins to these shores. We suppose they are blown north by unusual storms; most are stunned or dead by the time they reach here."

A northerner must get used to the idea of cold coming from the south and to January being the height of summer.

In the park administrator's lodge, Don Horacio showed me paintings of gaucho costumes and life of the last century.

Many Uruguayan painters, notably Juan Manuel Blanes, painted scenes of the early Uruguayan countryside, much as Frederic Remington and others pictured our own vanished West.

"There were three principal periods of gaucho dress," he said. "Both of the early costumes were called *chiripá*." This was a diaperlike nether garment that passed between the legs and fastened at the waist, to hang loosely at the sides.

"The primitive *chiripá* existed from about 1800 to 1840 or so; the second *chiripá* was used until about 1880 or 1890. From then on the *bombacha* became fashionable" (page 640).

Bombachas are loose, baggy trousers fastened at the ankle; Uruguayans wear them looser and fuller than do Argentines.

"Now," Don Horacio said sadly, "breeches are beginning to replace the *bombacha*."

Cowboys in Berets

Curiously, the flat-crowned felt hat of the gaucho, worn over a head kerchief, has given way to the Basque *boina*, or beret (page 635). Possibly because of the influence of the large number of Basques in the country, most cow hands wear *boina*, sash, and rope-soled canvas shoes with the *bombacha* (page 641).

The gaucho rarely wore boots or shoes. He wrapped his feet and calves in leggings of raw colt's hide with the hair on. Bare toes protruded, so that the big toe could grasp the brass ring or T at the end of the stirrup leather.

"Some of the old boys, from riding so long in this fashion," said my host, "looked like parrots when they walked, with the big toe standing out nearly at right angles."

On the savannas where wood is rare, cow dung furnished the only fuel available to the gaucho. In fact, so scarce was wood of any kind that walls around wells and other low fences were made of cows' leg bones, and horses' and cows' skulls formed the traditional chair of the gauchos.

Rough, self-reliant, quick-witted, and superb horseman, the gaucho was as handy with a guitar as with a knife. He liked to engage in bouts of couplets, sung to a guitar, while relaxing in a *boliche*. These little general stores served liquor from behind an iron grill.

Some *boliches* even had a kind of portcullis between the bar and the door. If a customer became belligerent and refused to pay, the barkeeper would unfasten a rope, and clang!

* See "Life on the Argentine Pampa," by Frederick Simpich, NATIONAL GEOGRAPHIC MAGAZINE, October, 1933.



Great Falls of the Uruguay River Block Navigation 200 Miles Upstream

From shore to shore the roaring cataract drops down a ladder of black basaltic rocks. Shadowy patches in the distance mark eucalyptus groves planted in a sea of grass to shelter livestock. Separating Uruguay (right) from Argentina, the river joins the Paraná above Buenos Aires and becomes the Río de la Plata.

down would come the iron gate to hold him prisoner until the authorities arrived.

W. H. Hudson, Argentine by birth but of New England parents, made the gauchos live again in his book about Uruguay, *The Purple Land*.

All Uruguayans love the colorful gaucho of their country's past, and the highest compliment they can pay you is to say you are *muy gaucho*.

Just beyond Santa Teresa, the border town of Chuy straddles the international line. One side of the main street is Uruguay; the other Brazil.

Oxcart a National Symbol

Near here, a small fort, San Miguel, part of the colonial border defenses, forms another national monument. Here the Government keeps an exact duplicate of the old ox wagon of the plains.

Corresponding to the covered wagon of the American West, the high-wheeled wagon with

rounded top was, with the passenger diligence, the only vehicle that crossed the expanses of "shoreless plain."

In Montevideo stands a bronze monument to this piece of the Banda Oriental's past. By the noted Uruguayan sculptor José Belloni, it is one of the most beautiful public monuments I have ever seen (page 644).

Many wars have raged about the frontier area. The Uruguayans have always been known as good, tough soldiers. They tell a story about a General Medina, who fought early in the 19th century against the Portuguese. Leading a cavalry charge against the enemy, he shouted an order.

"Take off your ponchos, boys; it won't be cold in the next world!"

A line drawn from Montevideo to Rivera in the north divides Uruguay almost exactly in half.

I flew to Rivera one morning, crossing at Durazno the River Yí, beloved of the hero of *The Purple Land*.



Vultures Love This Dried Beef, but Can't Touch It

A Uruguay countrywoman hangs meat aloft as if to invite aerial raiders. She knows that native carrion birds must sit to eat. One of these birds is the carancho, which, unable to decide on an eagle's or a vulture's life, hunts prey and scavenges the dead (page 637).

Not far beyond, the Rincón del Bonete power dam backs up the Rio Negro into a tremendous ramified lake (page 646). The Negro, largest river within the country's borders, traverses all of Uruguay from east to west before it empties into the Uruguay River.

The big hydroelectric project of Rincón del Bonete assumes particular importance because Uruguay has no oil or coal, except a very low-grade lignite, and must import fuel. Two power lines already carry 75 percent of the potential power to Montevideo, 150 miles away. When fully operating, the project will generate nearly 500 million kilowatt-hours of electricity per year.

Amethysts in Hollow Stones

Near Rivera, agate and amethyst occur in geodes, rounded stones that when broken open reveal a miniature cavern of glittering six-sided crystals of clear quartz and violet amethyst.

In the yard of one house in Rivera I saw walks bordered by crushed amethysts, slowly bleaching white in the hot sun.

No one knows what causes the color in amethysts. It may be manganese, say some; or possibly it has an organic source. If exposed to strong daylight, the violet color slowly fades.

Ancient lava underlies this area. A gem cutter told me how the geodes were formed in it.

"When the lava cooled, millions of years ago, gas bubbles in the plastic mass left hollows, like the holes in Swiss cheese.

"Somehow, water either filtered through or condensed in these hollows, depositing in the hole these layers of mineral, first agate, then quartz, and finally in some cases amethyst."

He told me that all three are basically the same substance, with a hardness of 7 in the scale where the diamond is 10.

Solid stones made up entirely of agate show rings of gray,



Uruguay's Large Spanish Population Includes Many Bereted Basques

Even the cowboys, *gauchos* of yesterday, have given up their brimmed felt hats for the beret. This boatman piloted the author through rough seas where the Río de la Plata joins the South Atlantic.

white, red, and brown when sliced lengthwise. Cutters polish such sections to make ash trays and paperweights.

To cut gem amethysts, lapidaries look for a flawless dark-violet crystal, then usually shape it in square or rectangular emerald cut.

The ancients thought amethysts would prevent drunkenness. (The original Greek form of the name means "not drunk.")

When I asked where the topazes I had seen in the capital's shops were mined, the lapidary smiled and said, "They're amethysts, too. When an amethyst crystal is heated for a time at about 750 degrees, the color changes to golden yellow."

Country people produce these exquisite

golden gems by heating the rough crystals in a fire made of cow dung. When the fire, kindled in a hole in the ground, dies down to embers, they put in the crystals and cover the pit with sand, then let it cool slowly for two or three days.

Beef Roasted in the Hide

Flying northwest toward the Uruguay River, we landed at a ranch between Artigas and the river. At an outdoor barbecue here we tasted *asado criollo*, which was a kid split open and roasted whole by spread-eagling it on an X-shaped rack that leaned over a fire.

Over another fire, *asado con cuero*—beef with the furry hide still on—sizzled and sent

an exciting aroma into the air. Naturally, the hide is not eaten; it merely serves to seal in the juices.

While we ate at a long table under the trees, ranch hands sang and accompanied themselves on the guitar.

We flew west to the extreme northwest corner of Uruguay where, at the confluence of the Uruguay and Cuareim Rivers, Brazil, Argentina, and Uruguay meet; then we flew south along the Uruguay to the city of Salto.

Looking down on the level green of open country, we saw dark rectangular groves of eucalyptus trees. Planted to give shelter to cattle during windstorms, the regularly spaced oblongs looked exactly like ships strung out in convoy over the sea of grass.

Salto vies with Paysandú, 65 miles downstream, for the honor of being the second city of the Republic. At latest count, Salto had a slight edge.

Orange and tangerine groves stretch in geometric patterns about the white houses of Salto. Vegetables ripen more quickly here than in the cooler climate of Montevideo.

Salto at Head of Navigation

The Uruguay River, flowing southward from Brazil, separates Argentina from Uruguay. At Salto, 200 miles from where the Uruguay empties into the Río de la Plata, river steamer navigation ends. A chain of falls and rapids bars navigation.

Motor launches ferry passengers across the wide Uruguay between Salto and Concordia, the city on the Argentine shore.

With Salto city officials I attended a rededication of the monument to Giuseppe Garibaldi, Italian patriot and idealist. Garibaldi wrote a little-known chapter of his adventurous life in Uruguay, when in 1846, at the head of his Italian Legion, he won two battles that helped secure the independence of the Republic.

While Salto's people, many of whom are of Italian descent, gathered at the Garibaldi monument, I noticed what seemed to be dark smoke plumes on the horizon. Slowly the clouds attenuated into wavering lines and came toward us. Then, with a whirring and rustling, millions of locusts swarmed between us and the sun, glistening like metal against the blue sky.

My companions pointed to rows of citrus trees. Most had been stripped to the bare branches, while the glossy green foliage of other rows remained untouched.

"The whole ones are the tangerine trees," said one man, "Locusts don't like their leaves; too bitter."

Locusts periodically sweep south from the Argentine and Paraguayan Gran Chaco to ravage Uruguay and the adjacent Argentine provinces. Airplanes and helicopters spray insecticide over wide areas in a successful war against the devouring invaders.

A short distance above the city of Salto a spectacular series of falls and rapids, the Salto Grande (Great Falls), stretches from shore to shore.

In low water scores of roaring cascades pour over worn black basalt and discharge into long gorges (page 633).

The amber water swirls and foams through the canyons, forming powerful whirlpools in the fast current.

Fishing at Great Falls

Here, in the glassy glides above the lips of the falls and in the turbulent pools below, the dorado loves to lie. *Salminus maxillosus*, one of the world's great game fishes, looks like a yellow salmon, with finely penciled lines of broken dots along its sides (page 653).

These voracious predators sometimes reach a weight of 60 pounds, though they average much less.

At the Salto Grande the Uruguay Tourist Commission maintains a ranch-style guest house. From here I fished for dorado with a friend.

As our boatman rowed us along the foot of the falls, we cast big spoons into the foam-flecked eddies. Masses of floating spume lay like beaten egg white in the backwaters, and the beat beat back from the black rocks.

Suddenly an electric shock leaped along my rod. One hundred yards of 9-thread line melted from the reel, and downstream, so remote that it seemed to have no possible connection with me, a great golden fish leaped and fell back with a smash.

The incredible shock and downstream dash occurred almost simultaneously. Practically nothing can stop a dorado in this initial rush. They fight hard, leaping repeatedly as long as they are in fast water. The biggest I captured weighed just under 20 pounds and took 18 minutes to bring to gaff.

The Colorful Dorado an Epicure's Dish

When fresh from the water, the dorado makes a striking picture. Orange-red fins and tail complement his over-all golden-yellow coloring.

The head and gill covers appear to be plated with amber tortoise shell, and the big mouth shows wicked triangular teeth that cut steel leaders, and sometimes even big hooks, with the ease of wire cutters.



Uruguayan Trenchermen Never Slice Off More than They Can Chew

Old-time gauchos ate barbecued beef by grasping a hunk in the teeth and cutting away all but a bite. The sharp *facón*, or belt knife, served them in combat as well as at dinner. Connoisseurs prize whole beef roasted in the hairy hide, for the juices are sealed in (page 635). This descendant of gauchos works on a cattle ranch near Artigas. His sure hand has never nicked his nose.

Ashore, we cooked some of the dorado over an open fire. I am not much of a fisheater, but fresh-caught dorado, roasted over an open fire, is an epicure's dish, especially when the flaky white flesh is covered with a caper sauce.

When we later waded and fished, armpit deep in the shallower waters at the tail of the cataract, our rope-soled shoes picked up pebbles of many colors, fragments of agate and quartz washed downstream and worn round and smooth by the current.

Some pebbles glowed like tawny red rubies when held between the eye and the sun.

Others looked like candy caramels with a spiral white filling.

The Uruguay washes so many agates ashore that the walls and sidewalks of the riverside promenade at Salto have rows of agates set into them.

Everyone Drinks Mate

Most of the world drinks coffee or tea for a pick-me-up beverage. The Rio de la Plata countries prefer mate. Like tea or coffee, mate (*Ilex paraguariensis*) grows as a shrub or small tree. Mateine, a substance similar to caffeine, provides the stimulus in mate.

Commonly in the cities and towns shortly after sunrise I would see men, still in their pajamas, standing in their doorways and pensively sucking mate out of a pear-shaped or flat-sided gourd.

They call the gourd *mate*, also; the silver drinking tube is the *bombilla*. It takes so long for the liquid to seep through into the perforated bulbous end of the tube that drinkers acquire a patient, thoughtful air while sipping mate.

Friends showed me the proper way to prepare and drink it. Soon, like them, I carried my own mate and bombilla with me when traveling and called for hot water the first thing on awakening in the morning.

To prepare mate, I first placed the bombilla in the gourd; then I filled the gourd about two-thirds full of *yerba*, dried leaves and twigs of the mate tree. I added cold water to saturate the leaves. Now I poured in very hot water, and waited.

It takes time for the liquid to seep slowly into the pierced bulb in the end of the silver tube. Even then, I could draw up only the small amount in the tube. After that, I waited for it to fill up again.

And so the mate drinker goes on, periodically adding hot water from a small kettle, or, if he lives in the city, from a thermos bottle with a specially perforated stopper.

In its natural unsweetened state, mate tastes like green tea, more or less bitter and astringent, according to the variety and source. The herb is intensively cultivated, particularly in northern Argentina, but much of it still comes from wild trees in southern Brazil and Paraguay.

Men Drink the Bitter; Women the Sweet

Men usually drink bitter mate; women like to add a little sweetening. Sometimes they even brew it in a pot, like tea. But confirmed mate drinkers will have none of this effete procedure.

On the cattle and sheep ranches the hands get up about an hour before dawn and sit tranquilly sipping mate while they await the sunrise.

After working all morning on the range, the cowboy or shepherd drinks mate at 11 or so, and then again at the end of the day (page 641).

"But," said my friend who was telling me all this, "there are some who pass the entire day drinking mate."

In the old days, the gaucho subsisted almost entirely on mate and meat—beef, kid, or mutton. Apparently the mate supplied some of

the elements needed to balance the diet, although the explorer Vilhjalmur Stefansson claims man can thrive on fresh meat alone if it contains sufficient fat.

Carnival Time in Montevideo

When I returned to Montevideo from upriver, Carnival had taken over the capital. All Uruguay joins in this festival with as much gusto as the Brazilians of Rio (pages 627 and 652).

Arches of colored lights spanned the principal avenue, from which traffic is cleared at night so that people may take part in the street procession.

At night most of the women are masked and in costume, and celebrants bombard one another with confetti and serpentines from floats or on foot.

Each section of the city erects a *tablado*, an outdoor stage decorated according to the ideas and abilities of the local talent.

On these stages perform mimmers' troupes, musicians, and anyone who thinks he has talent. At the end of Carnival the city gives prizes to the most original and ingenious performers.

In the capital's theaters, hotels, and clubs big public balls are given, some starting in the afternoon and lasting until dawn. Usually three orchestras play in relays—a "fox," or American-style dance band; a samba orchestra brought from Brazil; and a *tipica*, which plays tangos, milongas, and fast criollo waltzes.

Women go masked and unattended to these balls, which last not only the regulation three days of Carnival but also for another week.

I stood one night on the edge of a dance floor, watching the revelers dance by, their bright costumes a mass of changing color in the spotlights.

Sensing someone watching me, I turned to look into the dark face of a masque. It was a girl, her head completely covered with a sheath of black stockinet. Bunched and gathered cloth formed upstanding ears, and from eyeholes two bright eyes peered at me quizzically. Whiskers springing from each side of her mouth made her look even more pert.

We stared at each other in silence for nearly half a minute. Finally I asked, "Cat or rabbit?"

Looking as disdainful as two eyes can through black stockinet, she snapped "Bat!" and flounced off.

It would be ungallant not to let her have the last word.

The Purple Land of Uruguay



© National Geographic Society

Reproduction by Luis Marden

Garbed in Old-time Gaucho Costume, He Sings of Uruguay's Past

For a holiday barbecue this cowboy from Santa Teresa National Park wears the *chiripi* (skirtlike garment), kerchief, and felt hat of the gaucho, Uruguayan plainsman of the last century. Leather-covered weights of the *boleadoras*, Indian throwing weapon, hang from his waist. On his left arm he carries a broad-strapped riding crop.



© National Geographic Society

Reproduction by Laila Mitchell

This Painting by a Noted Uruguayan Artist Displays Three Epochs of Gaucho Dress

Juan Manuel Blanes here shows three generations of last-century Uruguayans. Mate-drinking grandfather (right) wears the original skirtlike *churripó*. Father (center) wears the middle-period *churripó*, no longer spilt in front.⁶ A suitor, calling on the householder's daughter, uses the loose, baggy trousers, *bombachos*, still worn in rural Uruguay and Argentina.



© National Geographic Society

Photographs by Alton Frisbet

Fire and Mate, Stimulating Tealike Drink, Warm Uruguayan Cowboys When Day's Work Is Done

The men sip mate through silver tubes from flat-sided gourds, more popular in Uruguay than the pear-shaped gourds used in neighboring Argentina. Drinkers fill gourds about two-thirds full of dried mate leaves, then add nearly boiling water from the kettle. These ranch workers wear Spanish-style rope-toed canvas shoes.



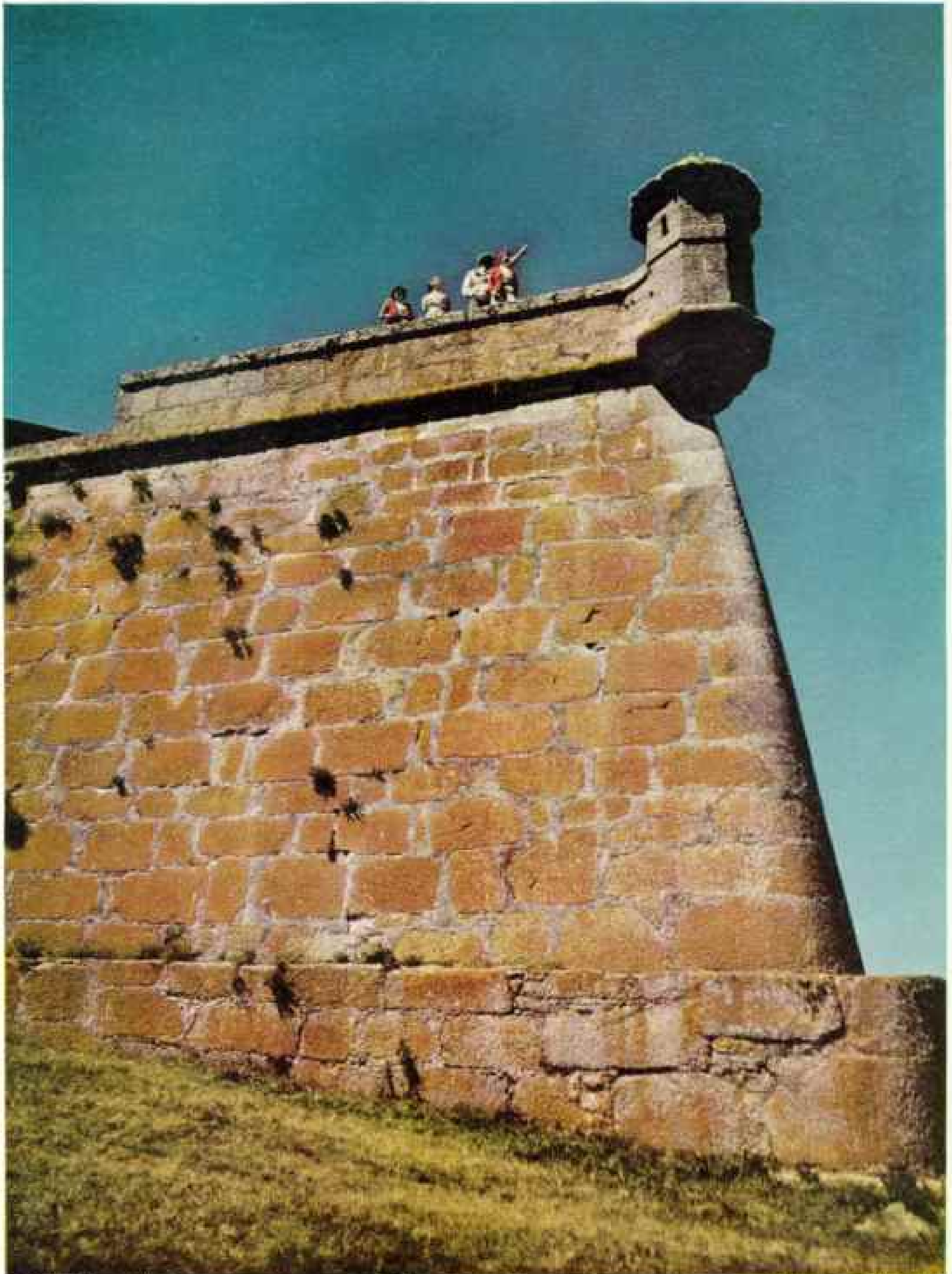
© National Geographic Society

Reproduction by Lutz Stedon

Oxcart Drivers Liked to Camp Near a Shady Ombú When Crossing the Nearly Treeless Plains

At San Miguel National Monument, the Government maintains this replica of the old-style ox wagon. High wooden wheels helped smooth inequalities in the ground; cowhides with the hair left on covered the top. The driver, in gaucho dress, sips mate while roasting a steak on a skewer.

The Purple Land of Uruguay



© National Geographic Society

Photochrome by Luis Malden

Lichens Like Orange Paint Coat the Walls of Santa Teresa

Restored by the Uruguayan Government, this fortress forms the nucleus of a large national park. On the shore close to the Brazilian frontier, it was built in 1750 to protect Portuguese possessions from Spain. The bastion changed hands in many wars among Portuguese, Spaniards, Brazilians, and Uruguayans.



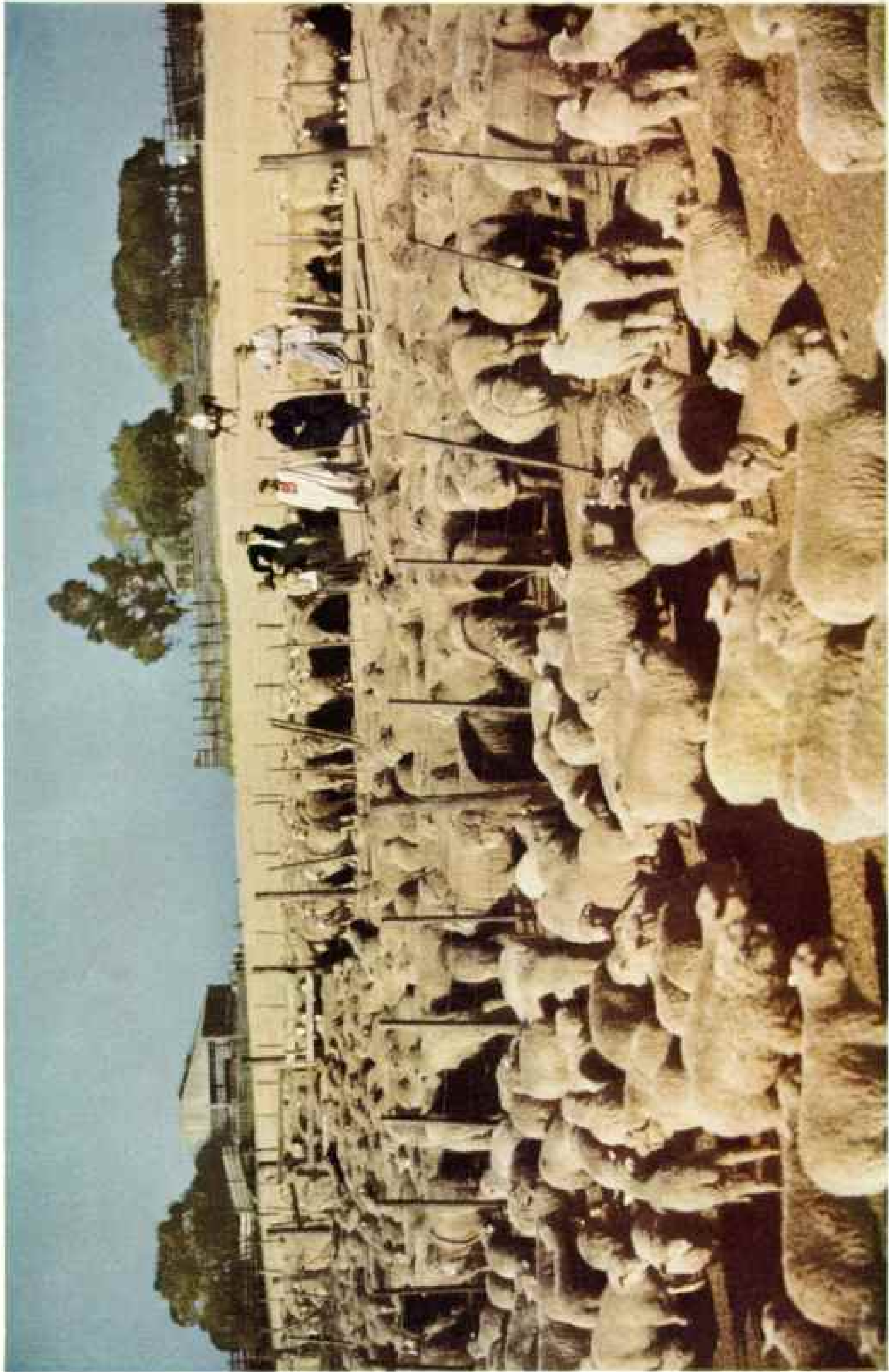
Frozen in Bronze, Oxen Struggle to Release Their Wagon from a Mudhole: Montevideo's Famed Oxcart Monument
 Uruguayans like to photograph one another against this covered wagon of the pampa; a creation of the sculptor José Belloni.



© National Geographic Society

The Monument Comes to Life at San Miguel in This Reproduction of Yesterday's Plains Wagon
 Visitors may also see a duplicate copy of a diligence, the coach which formerly carried passengers and freight across the "shoreless plain."

Reproduction by Latta-Mardon



© National Geographic Society

Kobalovna for Allen Fisher

Sheep at La Tablada Market Carry on Their Backs Uruguay's Most Valuable Export

Sheep now outnumber cows three to one in the Republic and furnish mutton as well as wool for export. Buyers assemble at dawn at this cattle market on Montevideo's outskirts. Against early-morning chill many wear long woollen ponchos. Most appear in comfortable plus-fours-like *bermudas* (page 640).



© National Geographic Society

Explanations by Albert Fisher

A Concrete Dam Impounds Waters of the Río Negro in Uruguay's First Hydroelectric Project

Situated almost exactly in the country's center, the Rincón del Bonete Dam forms an enormous lake. Two power lines carry electricity to Montevideo, 150 miles away. Flatcars on rails haul small boats around the dam. Eventually, two locks will permit larger vessels to navigate this largest Uruguayan river.

The Purple Land of Uruguay



© National Geographic Society

Kidchessna by Allen Fisher

Waves Break Like Ocean Surf in the "Sweet Sea" at Carraseo Beach

Spanish discoverers in 1516 named the fresh-water expanse of the Rio de la Plata, *Mar Dulce*. When winds blow from the east, Atlantic waters surge upstream, making the water at Plata beaches clearer and saltier. A suburb of gardens and summer houses here surrounds an elaborate resort hotel and casino.



© National Geographic Society

Mud of the Río de la Plata Reddens the Water at Pocitos, One of Fifty Beaches on the Uruguayan Riviera

Closer to Montevideo, Pocitos Beach waters are slightly less salty than those of Carrasco (page 447) and beaches farther east. Hotel and apartment houses with art-deco style replace many older private residences like those at right. A broad boulevard, the Rambla, connects beaches close to the capital.

Illustration of Alfred Fisher



© National Canned Beef Society

Uruguay's Excellent Corned Beef Travels Round the World

Canned meats are second to wool among the Republic's exports. Other meat products are beef extracts, frozen and chilled beef and mutton. Hides, once all important to the national economy, are of less value today.



Bookshelves by Alton Fisher

Schoolgirls Combine Good Looks with Good Books

The highly literate Republic stresses education, which is free from primary school to university degree. These girls, studying at home, attend the University of Women in Montevideo.



© National Geographic Society

Photographs by Allen Fildes

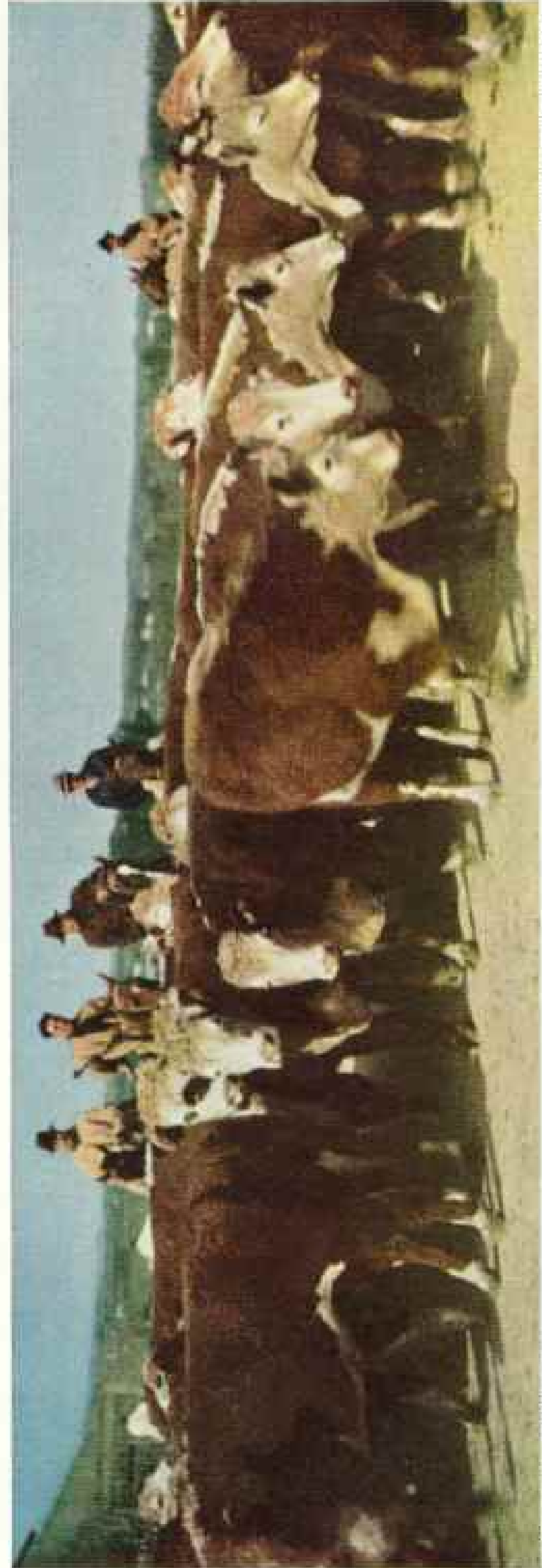
In This Olympic Stadium Ardent Montevidean Fans Watch the National Sport—Soccer

Such football is the national pastime of most of Latin America. In Montevideo, intense rivalry exists between two professional teams: Nacional and Peñarol. Like the United States' World Series, national matches make fans of all citizens. Peñarol won this championship game, 3-2.



At Early Morning, Whiteface Cattle Await the Last Roundup at La Tablada Stockyards

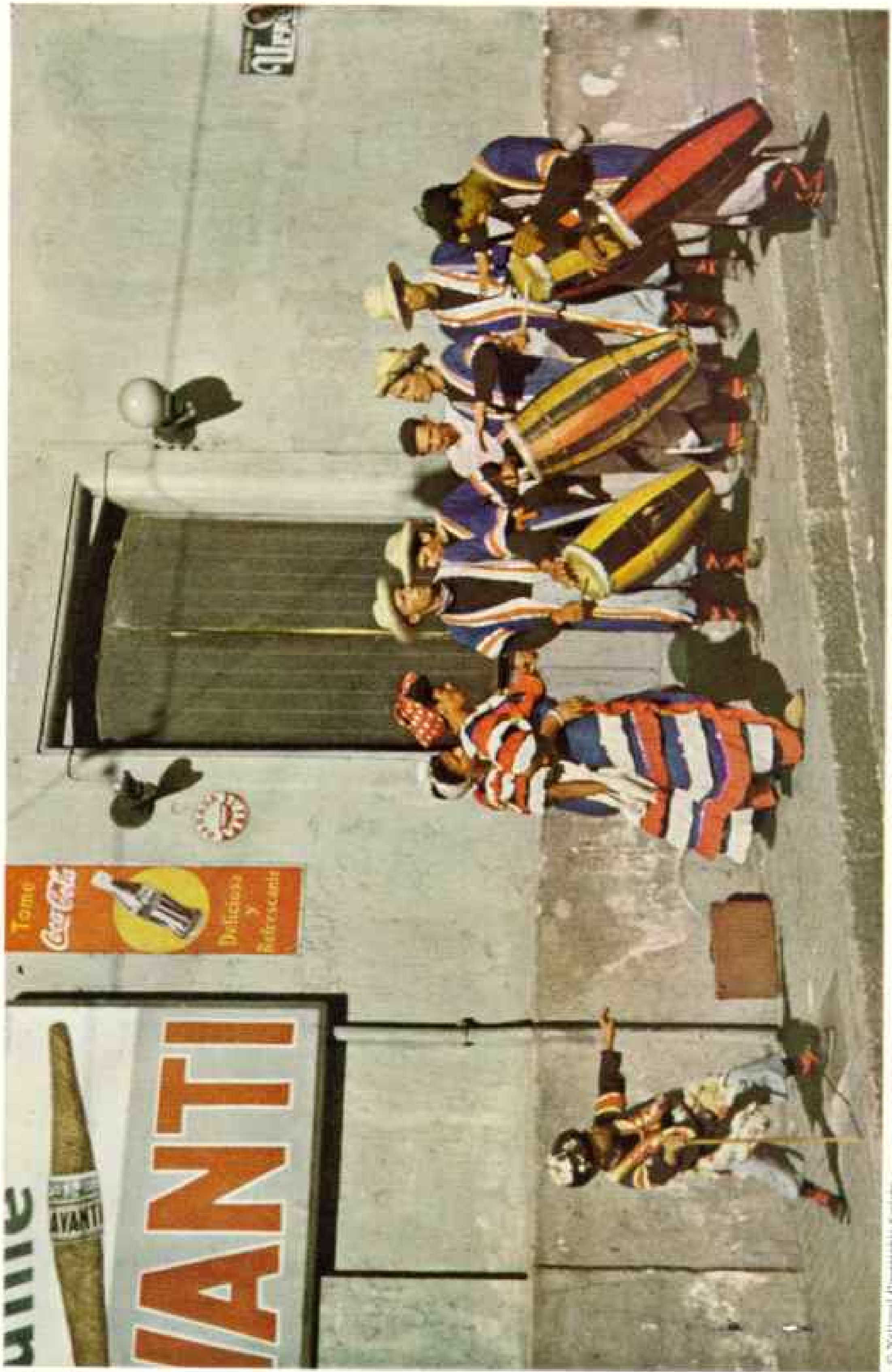
Horsemen lead their cows to and from market by calling repeatedly, "Foga, venga, venga!" (Come!), and herd sheep by rattling cans filled with stones.



© National Geographic Society

Illustration by Allen Fisher

Buyers and Sellers Discuss Beef on the Hoof at La Tablada Before the Drive to the Packing Houses



© National Geographic Society

They Dance and Pound Out African Rhythms for Coins During Carnival in Montevideo

Householders toss coins from windows to these groups, perhaps so they will move on, as they raise a tremendous din. To tighten nailed-on drumheads, players build fires of scrap paper in the gutter, then hold drums over the flames.

Photograph by Lella Sturden



© National Geographic Society

The Leaping Dorado Fights Harder than a Salmon

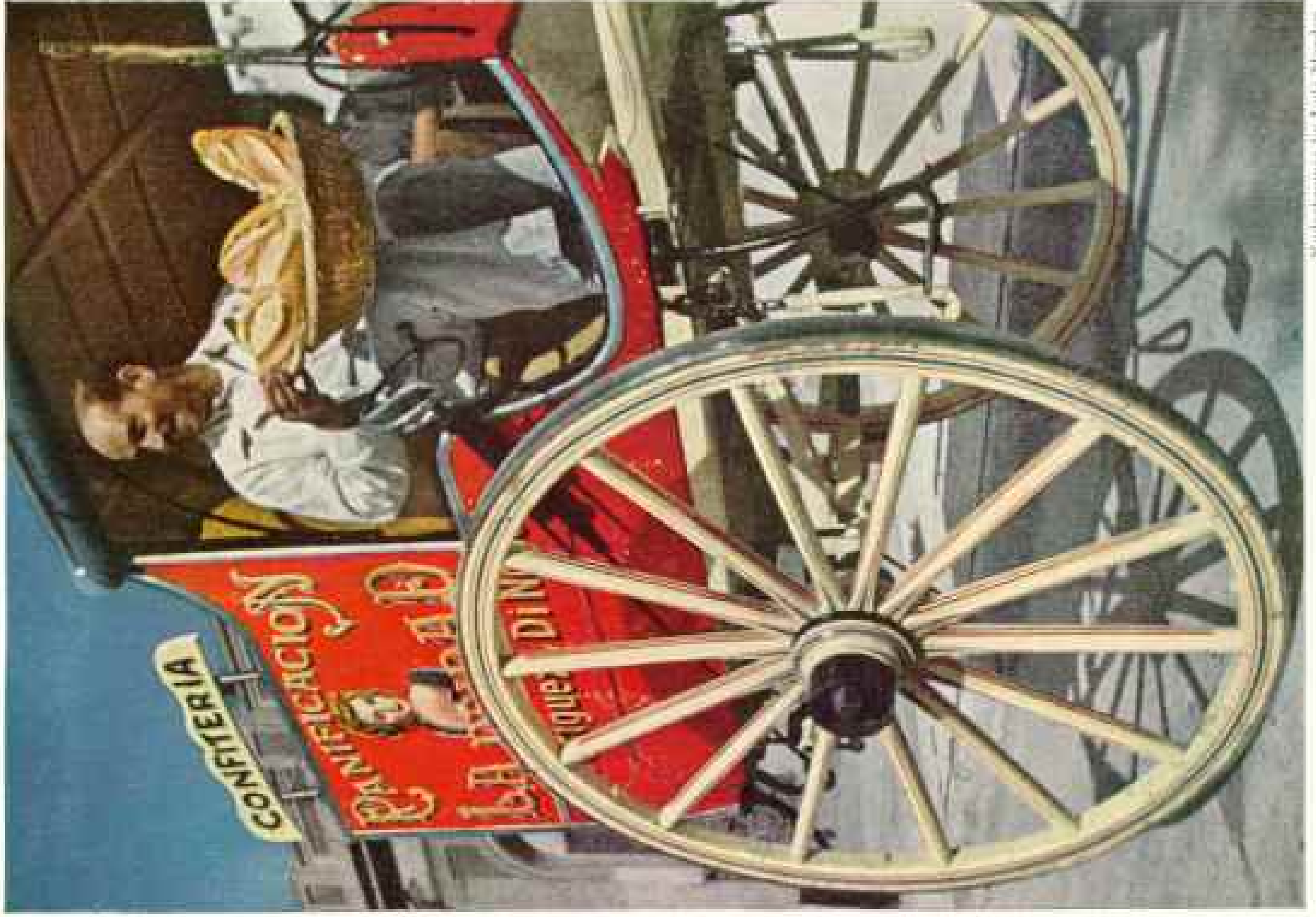


Illustration by Julia Madden

Bakers' Brilliantly Painted Wagons Brighten Montevideo Streets



© National Geographic Society

Exhibition by Luis Marden

The National Ensign Waves Before El Cerro, the Hill That Gave Montevideo Its Name

The cry of Magellan's Portuguese lookout in 1520—"Monte vid' eu!" (I see a hill!)—named the city. The ensign flies from the staff of a Uruguayan cruiser. Cargo ships lie at anchor in the harbor. Beyond, El Cerro rises to its height of 450 feet. The old fort atop the mount now houses a military museum and lighthouse.

The Fire of Heaven

Electricity Revolutionizes the Modern World

BY ALBERT W. ATWOOD

IN the short space of a single lifetime man has wrested from the universe its very essence, electricity, and by means thereof has literally transformed the world.

Man lived on earth hundreds of thousands of years before he learned to use this strange, invisible force. The ancients knew that amber, whose Greek name was *elektron*, would pick up straws if rubbed, and they no doubt cowered before the lightning.

But it is only in the last 65 or 70 years that electric power has been substituted in ever-increasing degree for the muscles of men and horses to perform thousands of laborious tasks and to provide us with a myriad of previously undreamed-of comforts, conveniences, luxuries, and pleasures.

Although electricity is a vital force in more than 40,000,000 homes, farms, schools, stores, offices, and factories in this country alone, and has probably changed our mode of life more than any single invention, its use has come to be taken for granted, much like that of water.

Seventeen years ago when Thomas A. Edison died it was suggested that a fitting tribute would be the turning off for just 60 seconds of every electric power plant in the country. But it was quickly realized that this magnificent tribute would also be a continental disaster.

What Power Means to Man

If all power were shut off, there would not only be darkness but the stoppage of all manner of vital industrial, commercial, agricultural, and domestic processes and functions. A large part of all our transportation and communication systems would cease, including telegraph, telephone, motion pictures, radio, television, and radar.

Without lights, signals, and dispatching systems, railroad trains would barely creep along, if they could move at all. Airplanes could not communicate in the air, nor could they land, and even automobiles would have difficulty in refueling. Naturally there would be no fire, police, or street signals.

Water supply and sanitation mechanisms would stop. Hospitals and surgeons would be terribly handicapped; compressed air and hoisting machinery in mines would not function; ships in distress would have no modern means of asking for help; vital scientific machines and experiments would be halted or

ruined; weather-reporting apparatus and electric-eye devices would go out; crowded elevators would be trapped between floors; people would be caught in subways under rivers—there would be terror, panic, and death.

It is a curious fact that, although the use of electricity is well-nigh universal and indispensable, the thing itself is very difficult to define. The common saying is that while we know many of the things which electricity does and how to make it, we do not know what it is, even after two or three thousand years of experience.

An old but pertinent story is that of the unhappy undergraduate who at the very start of an early-morning class was asked by the professor of physics to define electricity.

"I knew last night," replied the unfortunate youth, "but I've forgotten it."

"What a calamity!" exclaimed the professor. "The only man in the world who can define electricity and he has forgotten it!"

One reason we find electricity difficult to define is that it is not directly available to us in Nature in a form in which we can use it: we cannot run a steel mill by touching an electric eel, or by rubbing a parlor rug on a dry day, the stiff hair of a cat's back, or a piece of amber.

True, lightning is very powerful, and there are 16 million lightning storms a year over the earth (page 657). But lightning is too erratic to use; as Juliet said to Romeo of their love, "Too like the lightning, which doth cease to be ere one can say 'It lightens.'"

Sources of Electricity

Fortunately, we know how to get huge amounts of controllable and usable electricity out of falling water and from the steam which comes from burning coal, and to a less degree from oil and gas.

Electricity is only one of many forms of energy, which in turn is merely a name for capacity to work, and no law of physical matter is more fundamental than that of the transformation of energy from one form into another.

True, water power, coal, oil, and gas are by no means the only things which contain energy; it is found in food, wind, the tides, the sun, and in breaking up the atom (nuclear fission).

But atomic power waits upon the solution

of many scientific and engineering problems. Even then, so far as we know, we would have only a substitute fuel to be used in generating electricity; the far more costly business of getting the current to consumers would remain as now.

In actual practice in this country two-thirds of our electricity comes from coal and most of the remainder from water power; nor is any radical change in this method of generating electricity expected for some years to come.

Whether it should be produced by water power or steam in any given place or case is a question of the availability and cost of the resources of the area—in other words, of geography.

Switzerland, Norway, and Maine have no coal or oil or gas, but are rich in water, or hydro, power. Northern Illinois and Indiana are in general too flat for falling water, but great coal fields are close at hand.

The world has spectacular potential water power in the Yangtze River Gorges in China, in the upper Nile, and in the St. Lawrence. The Niagara Falls, and the Hoover, Bonneville, Grand Coulee, and Tennessee Valley Authority Dams, as well as those on the Susquehanna, Connecticut, and other rivers, are among the important sources of power.*

In the high Sierras of California, far from centers of population, one company alone has more than fifty hydro installations, dependent largely upon the melting snows of the mountaintops.† The forty-niners had to have ditches to wash out their gold, and such were the small, crude beginnings of these great hydro developments.

But falling water does not and cannot supply the country's needs for power. In many parts of America hydro is most useful when it can be combined or tied in with steam; hydro must be "firmed up" with steam.

A water-power plant may be more economical to operate, if not to build, than a steam plant. But droughts, on the one hand, and floods, on the other, may greatly lessen the usefulness of such plants.

Harnessing the Susquehanna

Only the St. Lawrence, of the North American rivers which flow into the Atlantic Ocean, has a larger watershed than the Susquehanna. Yet at the Conowingo Dam of the Philadelphia Electric Company the flow varies from 6½ million gallons a second to 15 thousand gallons. There is no way of storing the one extreme, and the other is far less than the flow needed to develop the capacity of the station.

Because of these inherent limitations, Conowingo runs at maximum capacity only half the time, although it is a valuable auxiliary source of power, especially during coal strikes. When there is ample water in the river, cities such as Philadelphia, Baltimore, and Washington economize by shutting down part of their steam capacity and drawing upon one or more of the Susquehanna dams.

One of the most unusual power developments in this country is at Holtwood on the Susquehanna. Here the Pennsylvania Water & Power Company has a hydro and a steam plant immediately adjacent to each other.

The steam plant uses finely divided particles of anthracite coal which the Susquehanna has carried downstream in its passage through the hard-coal region, and which are dredged up from the river bottom near the powerhouse (page 662). Thus the same stream supplies water power and "river coal" to make steam power. Approximately two and a half million tons of coal have been recovered and used in this way.

"Where the Giants Live"

A small boy upon entering a modern powerhouse said that "this must be where the giants live." He was certainly right, especially as regards the fantastic appetite of a steam-generating plant for coal and water. For example, the Commonwealth Edison Company, of Chicago, one of the country's largest producers of electricity from steam, uses 1,000 tons of coal an hour.

Steam plants do not use water to drive the blades of their turbines, but they use such prodigious quantities of it for other purposes that they are nearly always located directly on the shores of rivers and bays.

The Philadelphia Electric Company has five important powerhouses on the Delaware River, and one of them alone pumps directly from the river 120 million more gallons a day than the total daily water requirements supplied by the city of Philadelphia to all its customers.

A new steam plant of the Pacific Gas and Electric Company on San Francisco Bay will use about two and three-quarter times as

* See, in the NATIONAL GEOGRAPHIC MAGAZINE: "Along the Yangtze, Main Street of China," by W. Robert Moore, March, 1948; "By Felucca Down the Nile," by Willard Price, April, 1940; "Columbia (River) Turns on the Power," by Maynard Owen Williams, June, 1941; "Long River of New England (Connecticut)," by Albert W. Atwood, April, 1943; and "Around the 'Great Lakes of the South,'" by Frederick Simpich, April, 1948.

† See, in the NATIONAL GEOGRAPHIC MAGAZINE, "More Water for California's Great Central Valley," by Frederick Simpich, November, 1946.



© The Washington Post

Lightning, Untamed Electric Power, Strikes Squarely on the Washington Monument

Black streaks at the Monument's tip and elsewhere in the picture are lightning flashes of such high intensity that their light desensitized the emulsion on the film. Therefore, they appeared black when the picture was developed.



© The Chicago Sun

Electric Power Turns Such Cities as Chicago into Nighttime Fairylands of Light

Long rays extend out from the huge lighted ball that makes the Wrigley Building, in the background, an after-dark landmark. The mammoth Merchandise Mart, at left, alone uses as much current for lighting as 20,000 average homes. It has 380 miles of electric wiring and 60,000 electric outlets, including the sockets for its 40,000 light bulbs. Chicago's Commonwealth Edison Company burns 1,000 tons of coal per hour to make steam for generating the city's electricity and sends the "juice" through 9,112 miles of conduits (page 665). New uses for electric power now being developed include heating and cooling homes.

much salt water as the supply of fresh water for all the needs of the County of San Francisco, which of course means the city itself.

The steam itself is made from pure, distilled water. But it must be reduced, or cooled into water again, after it leaves the turbines, and for this purpose vast quantities of ordinary bay or river water are needed.

In fact, in one of the country's largest cities so many power stations are drawing in and discharging river water that the erection of another plant would raise the river's temperature by 10 degrees and thereby interfere with the operation of the already existing stations.

"On a Cushion of Steam"

It is a common saying among engineers that most electricity rides on a cushion of steam. Certainly one of the chief causes of the present extensive use of electricity is the modern

steam turbine, in which high speeds, high temperatures, and high steam pressures combine to reduce the amount of coal needed to generate a given unit of electric current.

The moving parts of a turbine are nothing but a shaft of large diameter to which are attached a series of small blades of the wind-mill type, driven by steam instead of wind. The ordinary steam engine, so vitally improved by James Watt, is a reciprocating affair, with pistons moving back and forth; whereas the turbine is a continuous flow, or rotary, machine.

The principle of the turbine is like that of the automatic lawn sprinkler and was known to the ancient Egyptians, but modern scientists and inventors had to devise materials to withstand the enormous speeds, pressures, and temperatures; Watt had no such materials.

After the steam has delivered its power, its



Acme

Lighting of Baseball and Football Fields Enables Many More Fans to See Games

Fenway Park, home of the Boston Red Sox, has illumination over entire field eight times brighter than that from an average home reading lamp. Attendance at night major-league baseball games averages three times the number at day games. All major-league fields but one are now lighted. Electric floodlights illuminate more than 1,000 college and high-school football fields, a like number of amateur softball fields, and hundreds of municipal and industrial baseball diamonds. Edison ushered in America's age of light in 1879 (page 671).

temperature drops in one-thirtieth of a second from 900° or 1,000° F. to 70°, and from a pressure of 1,200 pounds a square inch to less than that of the air outside.

Even an ordinary-size turbine is so powerful that the late Charles P. Steinmetz, scientist, estimated that it does as much work in 24 hours as all the slaves in the South could perform in 1860.

The boilers of a modern steam power plant are as high as an eight- or nine-story building, and the turbines are so large that I have stood inside of one from which the moving parts had been removed for repair.

This was in the Fisk Station of the Commonwealth Edison Company, of Chicago, the first all-turbine steam station in America. Although in operation since 1903, it is still an important source of power because of large modern units installed from time to time.

The visitor to a modern power plant is

struck not only by the extreme cleanliness and orderliness of the place but also by the fact that so few employees are required. Pulverized coal is handled by machinery, and it takes only a few employees to watch the meters, charts, and automatic controls.

Because a small plant requires almost as many operators as a large one, the sheer necessity for economy drives the companies to build plants whose generating capacity is as great as possible.

The Stimulus of Color

When I visited the Buzzard Point station of the Potomac Electric Power Company in Washington, D. C., about half the interior had been done over in the new color dynamics, with greens, reds, blues, and yellows taking the place of the old gloomy dullness of unpainted heavy machinery. Most operators prefer to work in the repainted sections.



George A. Lott

Her Nest Is "Wired for Electricity"!

A female black-chinned hummingbird feeds her babies in a tiny nest attached to an electric cord on a porch in Independence, California. Small insects and nectar comprise the menu. Birds nested in this spot for 20 successive years.

But how does all this huge machinery generate electricity?

More than 150 years ago the Italian scientist, Alessandro Volta, discovered that an electric current was produced by putting plates of different metals in a chemical solution in a cell, a group of such cells being known as a battery.

Storage batteries, so-called, do not store electricity; they store chemical energy. They are used for hundreds of purposes, including automobile ignition systems, emergency lighting, doorbells, and flashlights. But where large quantities of current are needed, the use of chemicals in batteries is too expensive.

Fortunately, Michael Faraday in England and Joseph Henry in this country, more than a century ago and at about the same time, discovered the principle of induced currents. Faraday found that rotating a metal disk between the poles of a large magnet induces—that is, impels or influences—a current of electricity to get under way in the disk. This discovery is the basis of the whole vast modern power industry.

The process goes on in a dynamo, or as it is now more commonly known, a generator, which is attached directly to the turbine. The more powerful the magnet or magnets, and the faster the turbine shaft spins the coil of wire around the magnet, or the magnet around the coil, the more voltage is generated.

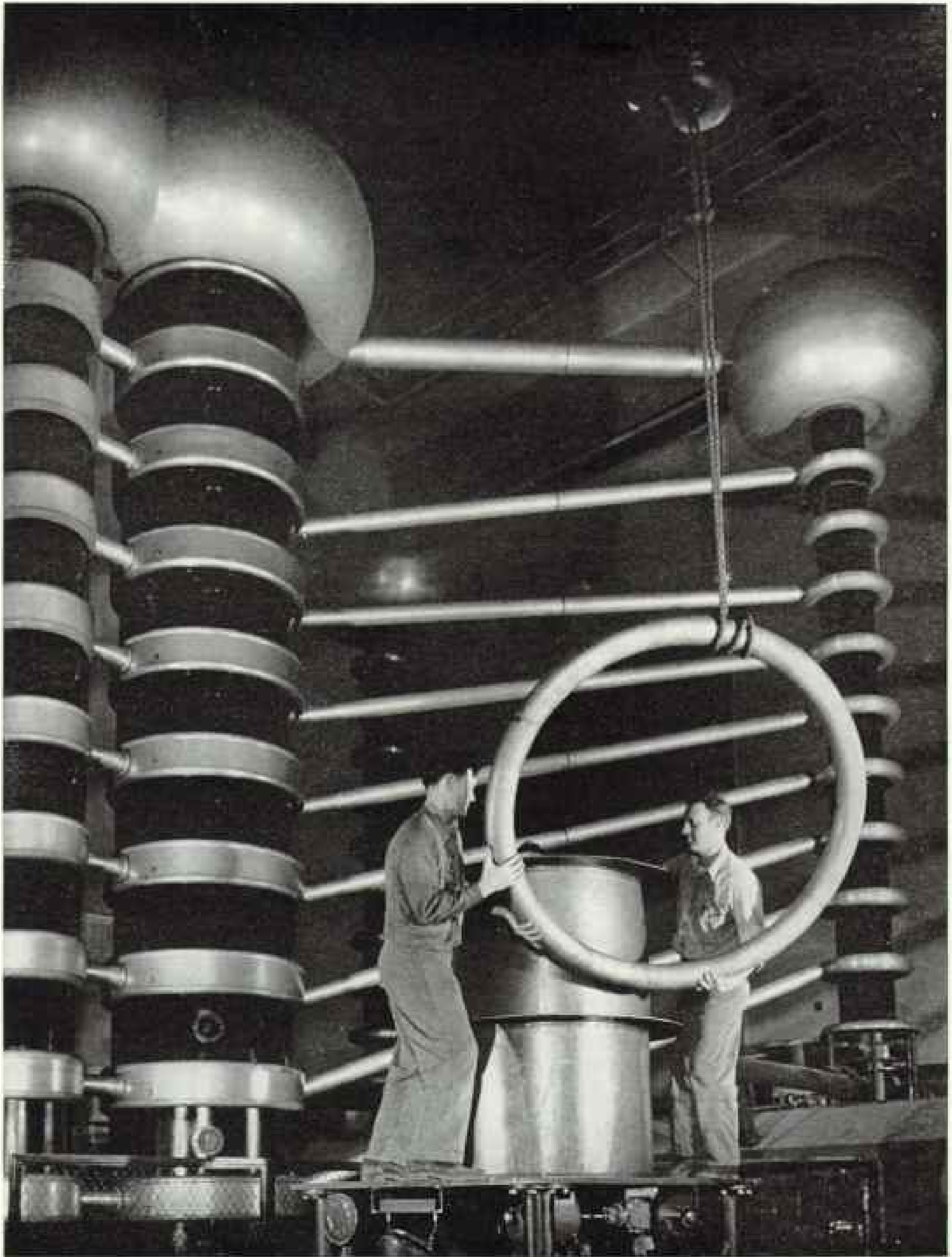
The Magic of Electrons

If we ask just why this process generates electricity, the answer plunges us deep into the mysteries of the cosmos. We are told that all matter—that you and I, my pencil and typewriter, the robin outside my window and the planets above—contains electrically charged particles of the atom, known as electrons.

Electrons are so small that it takes thirty thousand trillion trillion to weigh less than one ounce, and six million trillion of them must pass through the filament of a 100-watt lamp to keep it burning one second.

Naturally, our eyes cannot see the flow of electrons through a wire, which the scientists tell us constitutes an electric current. The wire looks no different, with or without a current, nor does it weigh any more or less.

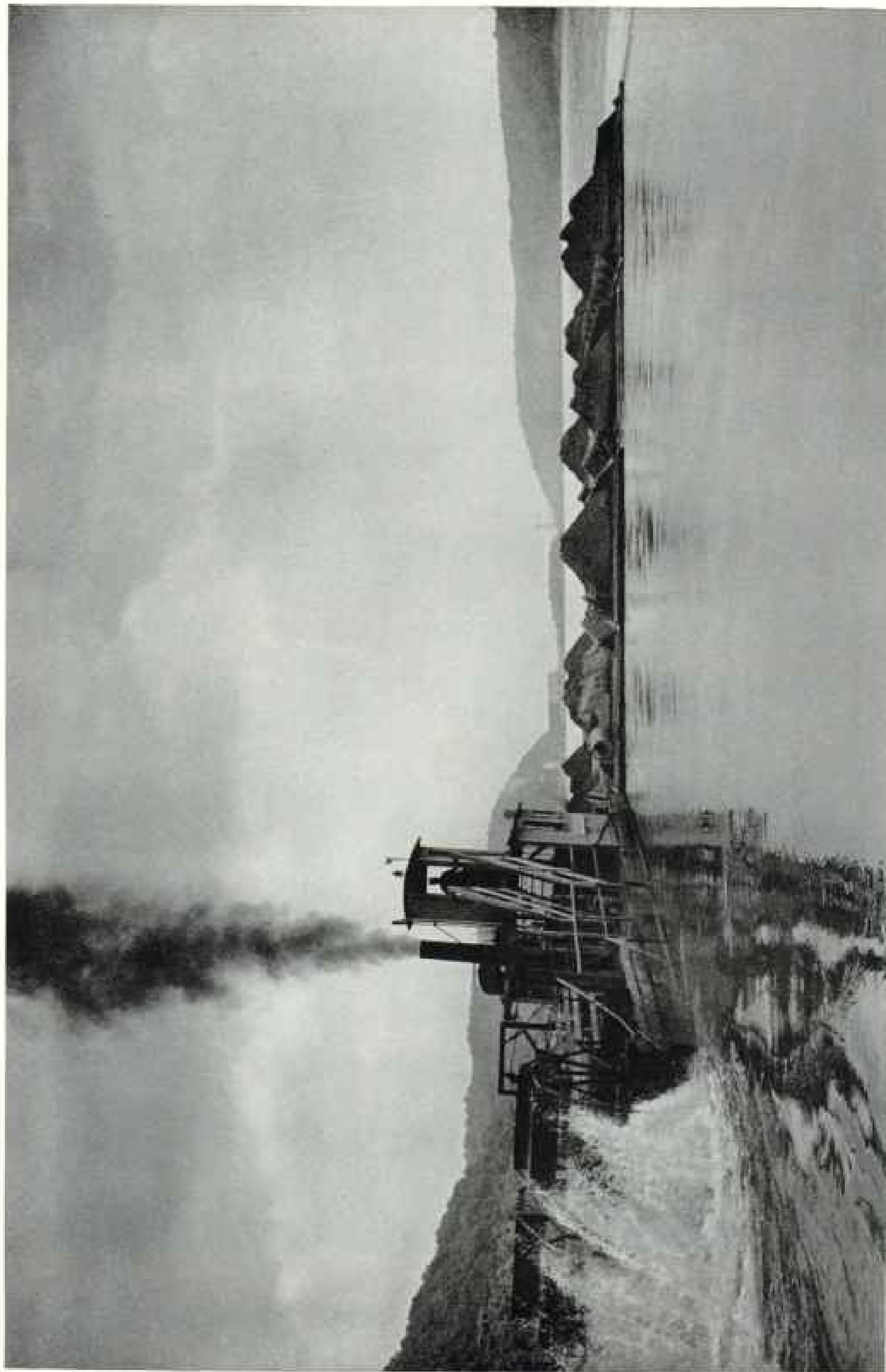
We know, of course, that one of the most fundamental laws governing every activity or lack of activity in the universe is that energy flows only where there is a difference in potential; in other words, electrons move from a spot where they are numerous to where they are scarce. A simple analogy is that water seeks its own level.



National Geographic Photographer Justin N. Locke

Giant X-ray Equipment Aids Study of Safe, Efficient Use of Powerful Radiations

Generator, left, at National Bureau of Standards, transmits power to huge X-ray tube at right to create a 1,400,000-volt X-ray beam. The beam is used to standardize medical X-ray dosages and to test the amount of concrete, lead, or steel needed to protect against dangerous effects of X-rays and atomic-energy radiations. Workmen are erecting ion tube for producing 17,000,000-volt gamma rays for experimental use.



Waste Coal Washed down the Susquehanna River from Upstream Mines Is Dredged Up for Electric Power Fuel

Bargeloads of silt containing 50 percent anthracite are pushed downstream to the steam electric plant, in the background, at Hollywood, Pennsylvania. Coal-bearing silt collects behind a dam that makes electricity by water power for the same company (page 656). Coal is separated from silt by washing or floating it out in oil.

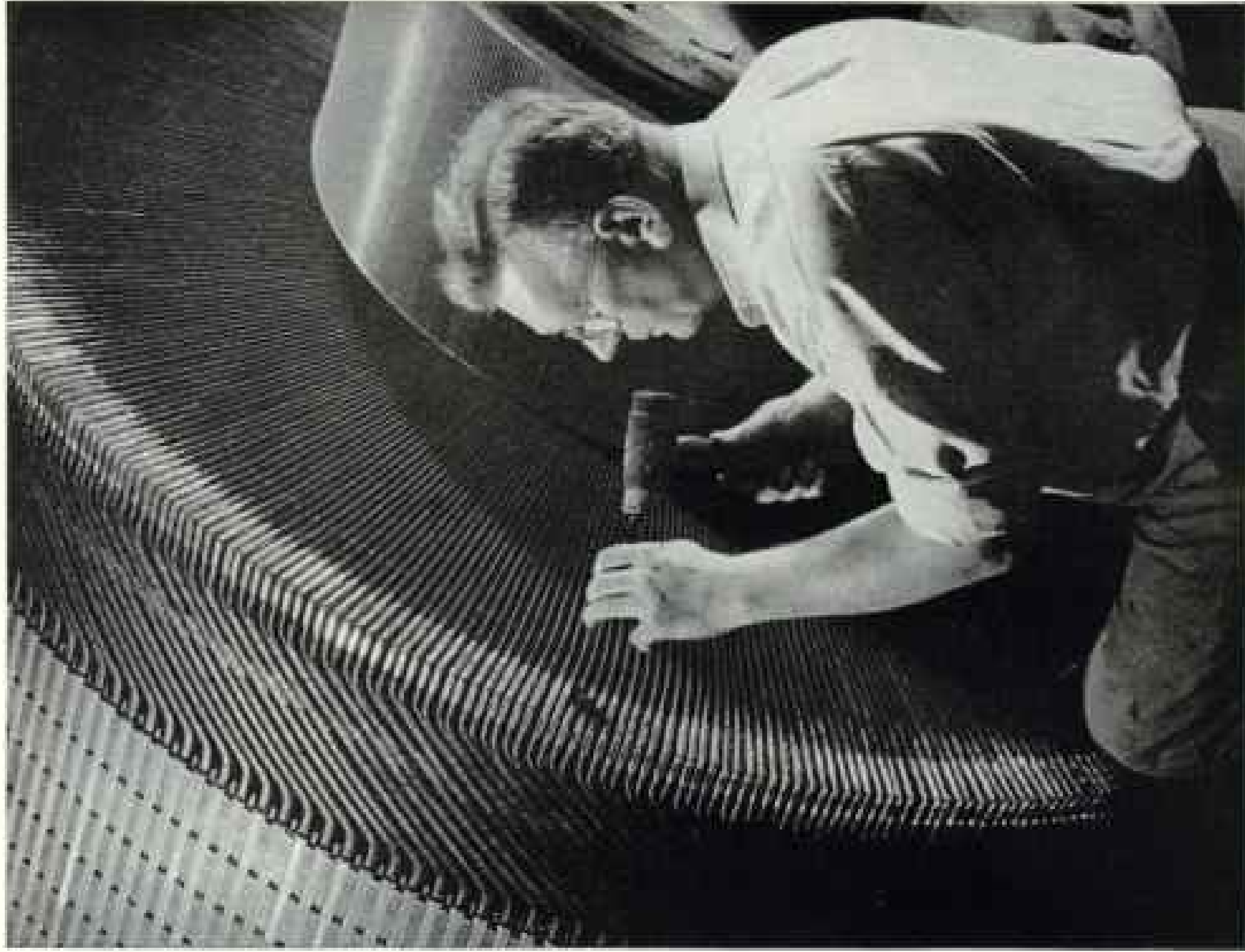
A. Arthur Hildner from Pennsylvania Water & Power Co.



National Geographic Photographer John E. Fletcher

Electric Power Makes Sheepshearing Easier

A 4-H Club member clips the wool off his sheep by the modern method, faster than the old-fashioned hand shears. Clippers driven by a crank and flexible cable are as fast, but require two persons to operate. The same clippers, with a different head, can be used to groom cattle, horses, or dogs for the show ring.



Westinghouse Electric Corp.

A Huge Generator Helps Make Wind Tunnel Hurricanes

It produces electric energy to regulate the speed of the six 6,000-horsepower propellers that blow air through the giant wind tunnel of the National Advisory Committee for Aeronautics at Moffett Field, California. An engineer adjusts one of the thousands of coils on the generator rotor (pages 660, 669).



Northern Illinois Farm Life

This Little Pig Went to the Electric Hog Waterer and Never Found It Frozen

An electric bulb, visible through the opening in the bottom, provides enough heat to keep water from freezing in this drinking trough. Normally, the waterer is placed at a lower level so that hogs may drink from it easily. Sixty-five percent of farms in the United States now have electric power (page 672).

Benjamin Franklin applied the terms "positive" and "negative" to electricity, but all that these two words mean is that unlike charges attract and like charges repel each other.

It was not so long ago that electricity was supposed to be a fluid, and it behaves in some ways as if it were; but whatever else it may be, it is not a fluid in the ordinary sense. However, we still use nomenclature appropriate to the outmoded fluid theory; we speak of electric "current" and even of the "juice."

At any rate, a generator works; it actually pumps electrons into the service of man. Most of us will be satisfied to agree with the definition of Bertrand Russell, the philosopher, that electricity "is not a thing, like St. Paul's Cathedral; it is a way in which things behave."

Once produced, electricity becomes an ex-

ceedingly practical, clean, convenient, versatile, and flexible form of power for human use. The steam engine was one of the fundamental causes of the Industrial Revolution, but its power must be used where it is made, because belts, shafts, and gears do not carry it far.

"Packaging" and Delivering Electricity

Electricity, on the other hand, can be sent over a wire with the speed of light, 186,000 miles a second, and is subject to unlimited subdivision and almost perfect control.

The housewife does not want a whole waterfall or an individual steam engine to provide power for her toaster.

Oliver Wendell Holmes said that electricity was power "stripped naked." There is the story of the Lancashire manufacturer who did

not at first see the advantage of putting in electricity, but suddenly tumbled to the idea. "Do you mean it can go around corners?" he exclaimed.

But to deliver electricity is a costly business, with thousands of miles of copper or copper-coated wires, thousands of poles, and such mechanisms as substations and transformers to package the bulk product for size—that is, to step it up or down for use by individual customers.

In the distribution system of the Consolidated Edison Company of New York there are 165,000 tons of copper, mostly underground, and 175,000 tons of lead.

The Commonwealth Edison Company, of Chicago, has 9,112 miles of ducts under Chicago's streets, 22,531 manholes, 38,000 transformers, and 145,000 poles (page 658). Incidentally, a cedar pole can be climbed only about 75 times because after that the spur marks make it unsafe, and a new pole must be installed.

Unfortunately, electricity produced in powerhouses cannot be stored, like most commodities, but has to be manufactured and delivered instantly on demand any time during the 24 hours of any day in the year, in any quantity which the customer may desire.

You press a button and the light comes on. You gain the illusion that you have tapped a reservoir of electricity. But this is not so. What you have done is to telegraph the powerhouse and cause the generator to produce that much additional current for your use.

But since power cannot be stored, there must be a reserve or excess producing capacity to meet the maximum, or peak, load, the word "load" simply meaning the combined uses of all customers.

During the war new civilian construction stopped; yet the use of power has soared beyond all previous experience. Because it takes from two to four years to make and install turbine-generators, reserve capacities fell seriously low for a time. Now, however, an enormous construction program, one of the largest of any kind in the world's history, is under way.

Controlling the "Load"

One must visit the load dispatcher's control room of a great power system to appreciate the degree of skill, ingenuity, and vigilance required to meet not only the usual peaks of demand but also the "outages," which are interruptions of service due to accidents, breakdowns, fires, floods, hurricanes, explosions, earthquakes, and the type of snow,

sleet, and thunder storms which carry down miles of wire.

In such a control room a few dispatchers hold the life of a great city in their hands.

They stand between millions of people and the destructive forces of Nature, and they fight a daily, hourly, and by-the-minute battle to see not only that there is continuity of service but that the right amount of power meets the enormous and in part unexpected variations in demand. Here is one of modern civilization's most vital nerve centers and general headquarters.

A Room of Magic and Gadgets

The room is an amazing orchestration of mechanical contrivances and gadgets. There is a telephone switchboard; two-way radio systems; innumerable meters and charts; blackboards and blueprints; special clocks; "mechanical brains," and other automatic controls. But these only relieve the dispatchers from having their hands on the controls every minute; these men make constant decisions, some of life-and-death moment.

In the smaller companies, with only one powerhouse, a load dispatcher's control function may be performed in the powerhouse itself. If a company has several power stations, the control room is usually on an upper floor of the general offices.

One such room in which I spent a whole day has armor-plated walls and doors. Admittance is completely controlled from within. There is a kitchen and a bedroom, and also three auxiliary lighting systems, in case the main power supply should fail.

At 4 or 5 o'clock in the morning (in some companies the afternoon before) a daily estimate or program is made out for the system as a whole and for each individual powerhouse. The most efficient station is naturally given the most power to produce, and the others provide reserve.

The total estimate is based on the experience of past years and upon the latest Weather Bureau forecast of temperature, wind, cloud, and sunshine.

The least change in weather conditions calls for the instant rearrangement of a complex system of transmission lines and the re-deployment of generating facilities. If the sun comes out suddenly in what has been forecast as a cloudy day, a whole station must be told to back down quickly; or, in reverse conditions, to come on.

In Washington, D. C., a few days before I visited the control room of the Potomac Electric Power Company, the estimate called

for 155,000 units of power at 6 a. m., and 157,000 were used. The 10 o'clock estimate was for 380,000 units, and exactly 380,000 were used. The 1 o'clock estimate was also for 380,000, but the sun came out and only 357,000 were called for (page 673).

I stood in the control room of the Commonwealth Edison Company, of Chicago, about four minutes before noon on a Wednesday in March, watching the many charts and meters. Suddenly the chief dispatcher said:

"Watch the noon drop, Mr. Atwood."

"What's the noon drop?" I asked in bewilderment.

"Don't you realize," he replied, "that we are just about to dump several hundred thousand units of power? Hundreds of thousands of factory hands and office workers will turn off their switches in the next two or three minutes. But most of them will be back at 12:30."

And, sure enough, the charts and meters took a terrific drop even as I watched.

The Geography of Power

Each locality has its distinctive peak load, annual and daily, depending upon climate, population, occupation, and industry. There is even a difference in this respect between the east and west coasts of Florida.

In many northern cities the annual peak comes a few days before Christmas, at about 5:30 p. m., when the load is heavy for home lighting, cooking, and heating, for factories, stores, and offices, for transportation lines, and for Christmas-tree lights and toy electric trains.

Some companies report three daily peak loads in December, just before noon, between 2 and 3 in the afternoon and just before 6 p. m. On the other hand, in Washington, D. C., and the southwestern cities, the annual peak load now comes in summer because of air conditioning.

Washington's all-time peak was at 1:20 p. m. on July 14, 1948. Clear weather had been predicted and 450,000 units estimated. But a storm developed unexpectedly, and with extreme heat 486,000 units were needed.

A combination of extreme heat and darkness normally makes for a heavy load, but above 100° F. large employers close their factories, stores, and offices, and the power has to be dumped.

One important duty of the load dispatchers is to act as a clearinghouse for the switching off and on of equipment for repairs and maintenance work.

There must be close telephone and radio connection between the central control room,

the power stations, the headquarters of the trouble districts, and the foremen on the job, to prevent workmen from going onto a piece of equipment at the wrong moment and thereby being electrocuted.

As I entered one company's control room at 10 in the morning, three men were at the phone and radio. There had been a serious fire in a large new housing development, and they were busy switching equipment around to make up for the "outage." Everything was normal within half an hour.

At noon I went out to lunch. When I returned, the three dispatchers were completely relaxed. One ate a sandwich, another wrote a letter, the third read a report. Suddenly the radio blared; the superintendent of a trouble district was talking to one of his foremen. "Were any of your men hurt on that last job?"

The dispatchers dropped what was in their hands and stood absolutely rigid. "No," came the reassuring reply over the radio, and the men relaxed instantly. One of them turned to me, sensing my inquiry, and said:

"I once sent a man to ground a high-tension line, and he was supposed to report as soon as the job was finished. For some reason he failed to do so. I grew more and more nervous. Suddenly the phone rang and a voice from one of the stations said, 'I've got bad news for you.' My heart jumped. At last, after years, I had sent a man to his death. Then the voice said, 'No. 2 boiler is out again!'"

Regional Pools for Emergencies

In one of the large cities it is estimated that the 854,000 residential customers may expect an interruption in service for an average of 55 minutes about once in six years. Severe sleet and snow storms, hurricanes, and floods are the bane of the power companies, and it is sometimes necessary after a disaster for a company to borrow repair crews from a neighboring company (pages 667 and 670).

Great progress has been made in recent years, especially during World War II, in tying together independent and separate operating companies, as well as those under common ownership and management, into regional pools for interchange of power.

At the present time, power can be sent over wires economically only little more than a couple of hundred miles, but experiments are under way to see if it can be sent greater distances advantageously.

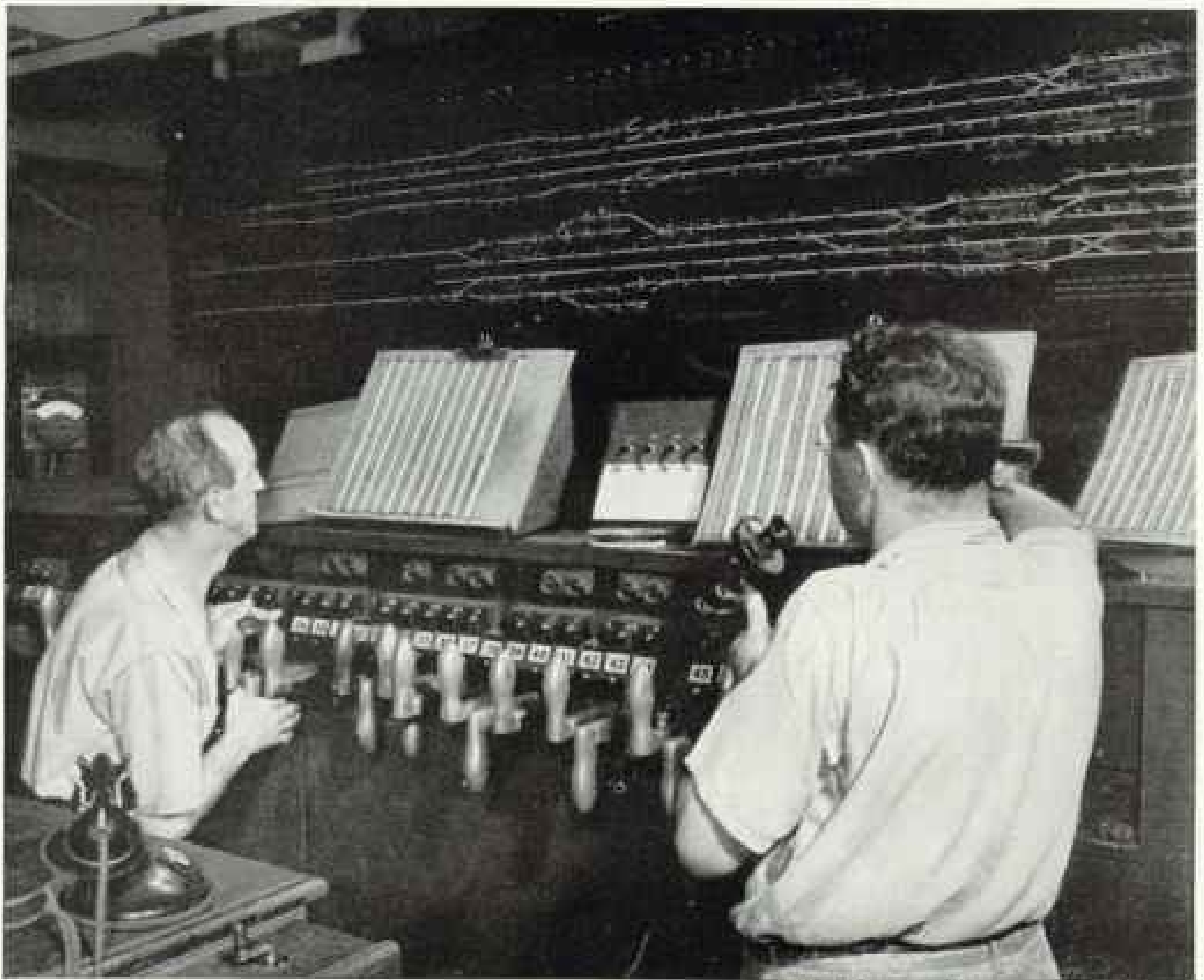
When Virginia ran short of fuel during a great coal strike, it naturally could not get power directly from New Orleans, even though



Central New York Power Corp.

In Winter Storms Wires May Break under Sheer Weight of Ice or Sleet Coatings

A lineman climbs out to repair broken wire at the end of the crossarm. Tree limbs may short-circuit lines as they bend under weight of ice and again when thaw releases them. Ice is melted off transmission lines by sending a heating current through them (page 666).



National Geographic Photographer Justin N. Locke

Routing New York Subway Traffic, a Towerman Watches Train Movements by Lights

White lines at the top of the picture represent the track layout in the switch control tower of the subway station at West Fourth Street. Tiny lights on the diagram show what sections of track are occupied by trains and which switches are open or closed. The man at left opens and closes switches electrically by pulling levers in the upper row. Lower levers operate signals that show train motorman whether track ahead is clear. Man at the right talks to another switch tower.

this city had a surplus because it could use another fuel. But Virginia was able to get help from North Carolina, which turned to Georgia, which drew upon Alabama and Mississippi, which in turn called upon New Orleans.

Or take a simpler case. Washington and Philadelphia are only 125 miles apart, but they help each other not directly but by way of Baltimore.

Power on Loan

This form of pooling means that a company with a surplus of power can help one with a deficit. This is possible because there are diversities among the different companies, not only in the source of their power but as regards the times during which it is most heavily used.

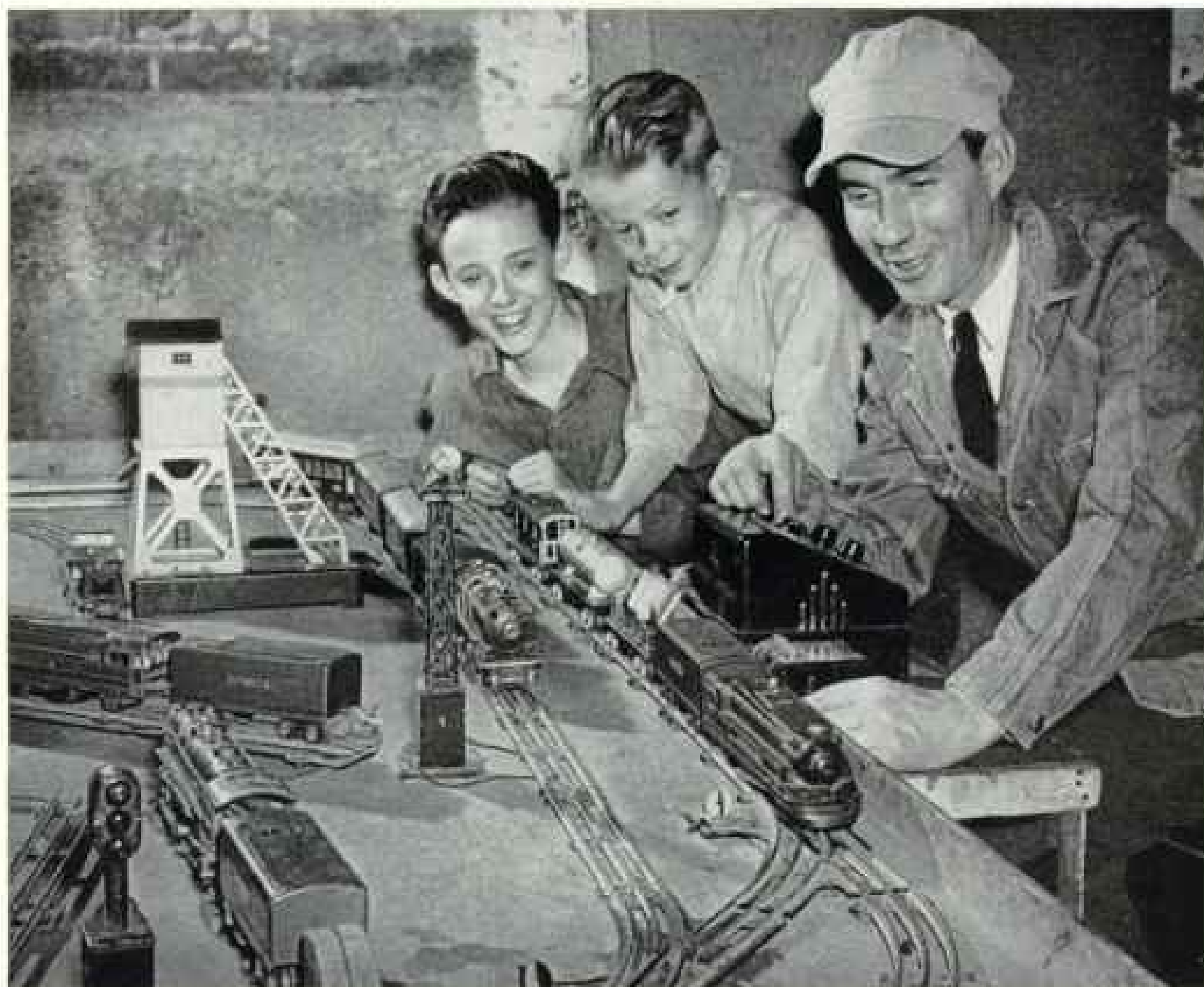
Also, of course, all the companies in a

pool do not as a rule have outages at the same time.

The Pennsylvania Power & Light Company serves the anthracite mines, textile and steel mills, and cement plants of cities such as Harrisburg, Allentown, Wilkes-Barre, Lancaster, Bethlehem, Williamsport, and Pottsville, its peak coming in the middle of the morning. If it runs short, it can draw on great cities like Philadelphia and New York, whose peak comes in the late afternoon.

Only relatively small quantities of surplus power are interchanged, for only very rarely are the lines of sufficient capacity to carry the output of a whole system.

However, the continual picking up and backing down of small amounts at many different points in a vast regional system establishes a coordination or equilibrium which makes a steady flow of power possible and



Amie

Electric Trains Make a Busman's Holiday for a Locomotive Engineer

After a day of hauling Long Island Rail Road trains behind his engine, Walter E. Weinell comes home to join his two sons in playing with their miniature locomotives and cars. Use of electric power in American homes has enabled millions of youngsters to enjoy toy electric trains. One and a half million sets were sold in 1947 for the enjoyment of boys and their fathers!

in times of disaster may provide the only service there is.

During the Connecticut River flood of March, 1936, neighboring companies rushed in emergency lines and spare equipment, restoring service until such times as the flooded power plants could be dried out and put back into use.

Dispatchers on the ground connected with adjacent areas wherever they could find a line clear or were able to use telephone, radio, carrier, or messenger. These two of many similar passages from the logbook of the Connecticut Valley Power Exchange during the flood are significant:

"Waterbury reported trouble at Stevenson. The plant went out, and they think an armature went bad. Rocky River is coming on the line and will pick up the load.

"Ripley reports 41 inches of water on the operating floor at Windsor Locks. Water

almost up to bushings on circuit breakers. Spare transformer on the way to Windsor Locks to make a temporary substation to carry Windsor Locks when the circuit breakers go out of commission. The canal bank has washed out."

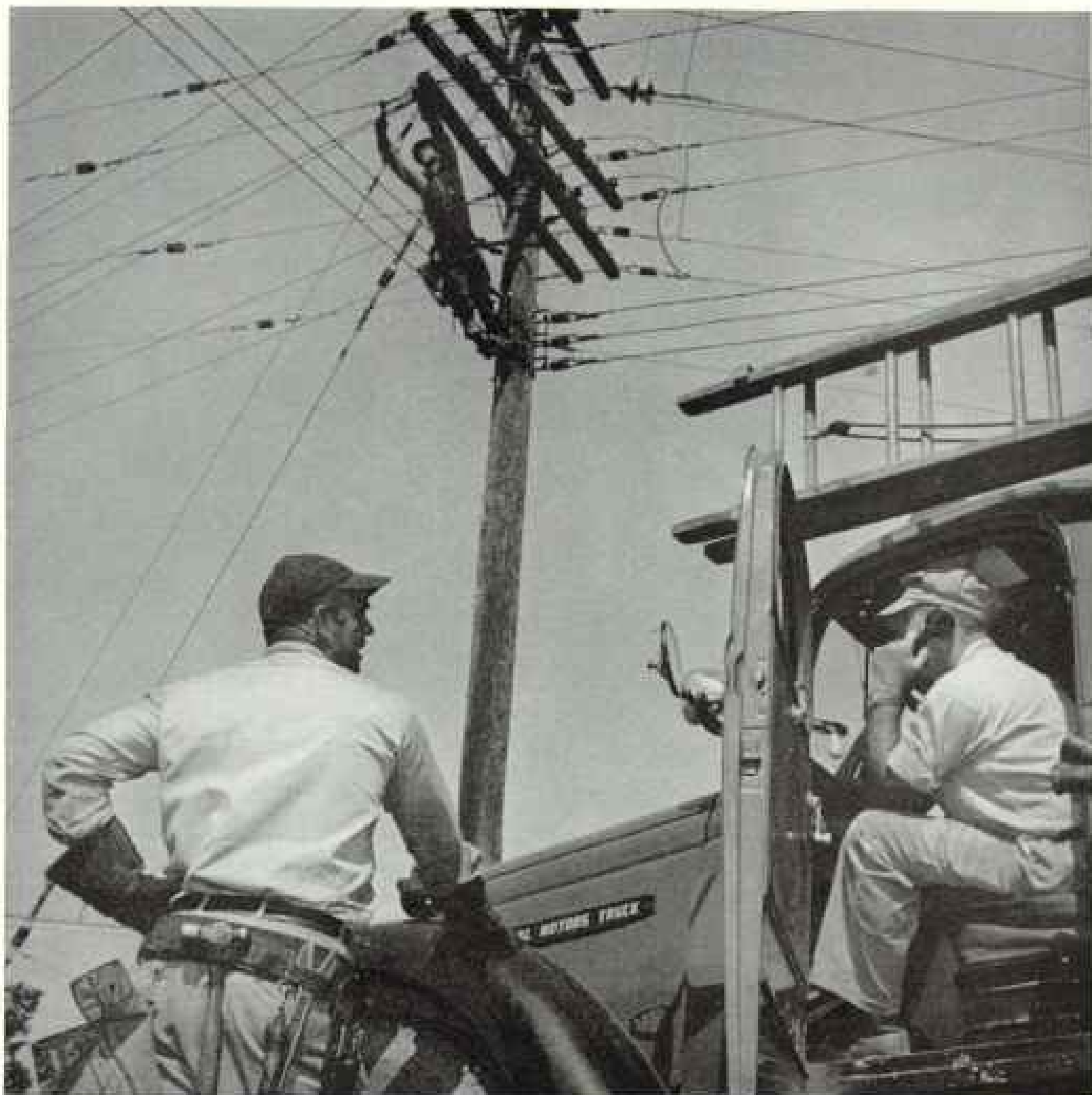
Most electricity is put to use by means of motors; millions of them are to be found in homes, stores, offices, and factories, ranging in size from a few as big as a modern six-story house down to some $\frac{3}{8}$ of an inch long and $1\frac{1}{2}$ inches in diameter.

Generators and Motors

The generator and motor are similar in structure, each being the reverse of the other.

The generator changes mechanical power into electric current, and the motor changes current into mechanical power.

A motor is needed to run a washing machine, a malted milk mixer, a juke box, a refrigerator,



National Geographic Photographer Justin N. Locke

Repairing Broken Wire, Emergency Crew Gets Word of New Job by Radiotelephone

Expert "trouble shooters" can handle live wires safely, using insulated gloves (worn by man at left) and other safety devices and tools that will not transmit current to their bodies. Two-way radiotelephones help direct repair trucks from one job to another without loss of time. Storms are a main cause of trouble on electric power lines. Autos strike poles, and occasionally airplanes get tangled in wires (page 666).

a vacuum cleaner, a machine tool, and thousands of other things.

Electric clocks are electric motors that run at the same relative speed as the turbine-generators of an interconnected region. The clock vibrates or turns over with the same heartbeat, so to speak, as the turbine-generators. The revolutions of these great mechanisms are in multiples of 60, in accordance with our system of time—60 seconds to the minute and 60 minutes to the hour.

If the turbine-generators run fast or slow, so do the clocks. In the winter of 1947-48 there was such a shortage of high mountain

snow pack in central and northern California that it became necessary to slow down the turbine-generators to reduce loads, thus slowing down the electric clocks.

Timing Clocks to a Fractional Second

There must be constant harmony among the tied-in powerhouses of a region to keep the clocks accurate; if a large customer such as a steel mill suddenly slows down, there is a bump which requires instant attention.

But usually the clocks vary only a very few seconds from complete accuracy. As I left the load dispatcher's office of a great system for

lunch, the clocks were running four-hundredths of a second slow; but when I returned, absolute accuracy had been restored.

There are in the United States approximately 1,000 stockholder-owned, business-managed, tax-paying companies, large and small, that produce and sell power. Numerous municipalities have their own plants, and the Federal Government has the great Tennessee Valley Authority and the Hoover, Grand Coulee, and Bonneville Dams.

The stockholder-owned, business-managed companies supply more than 80 percent of the country's electric power. They are essentially local companies. They make and sell most of their product locally, use local labor, and have many local stockholders.

They bring in new industries, develop local resources, contribute to better farming, and sponsor local improvements.

United States Leads in Power Production

With only 7 percent of the world's population, the United States in 1947 produced about 45 percent of the world's electricity. This was about six times more than Russia, the runner-up in 1947, was able to generate.

Among the large producers of power in this country are the Federal Government's TVA and the Hoover, Grand Coulee, and Bonneville Dams; and such stockholder-owned companies as: Consolidated Edison, of New York; Commonwealth Edison, of Chicago; Pacific Gas and Electric; Philadelphia Electric; Detroit Edison; Union Electric, of Missouri; Public Service Electric & Gas, of New Jersey; Southern California Edison; Duke Power; Niagara Hudson Power Corporation; New England Electric System; Commonwealth & Southern Corporation; American Gas & Electric; American Power & Light; and General Public Utilities Corporation.

It has taken an extraordinary number of brilliant inventors, physicists, and engineers, as well as businessmen of courage, foresight, and imagination, to make possible today's almost universal use of electricity.

Investment in the industry is between 15 and 16 billion dollars, and the estimated number of investors is 3,000,000, not counting the indirect interest of scores of millions of life-insurance policyholders and savings-bank depositors.

Queen Elizabeth's physician, William Gilbert, gave electricity its name and was the first to carry on real experiments. Referring to Gilbert, Francis Bacon in his book, *Novum Organum*, proved a poor prophet when he wrote:

"For the electric energy (of which Gilbert

and others after him have told so many fables) is only the energy excited in a body by gentle friction, and which does not endure the air."

Long after Gilbert's time, but also long before electricity was put to use, Benjamin Franklin learned an extraordinary amount about it, both theoretical and practical. Faraday and Henry (page 660) made the generator possible by their experiments in 1831. Thomas A. Edison not only ushered in America's age of light in 1879 but also inaugurated our system of central, or power, stations in 1882. His notable improvements on the incandescent lamp climaxed more than a century of experiment in England and America and, with power coming from a central station, brought the lamp into wide use and cheap production.

Soon thereafter George Westinghouse made possible the transmission of electric current over long distances.

In very few industries have the names of inventors found such a prominent place as in the electrical industry. Several of its most important terms, such as watt, volt, and ampere, come from the names of the inventors, Watt, Volta, and André Marie Ampère, and Edison's name is perpetuated in the titles of several of the largest of the modern power companies.

The story of the electrical industry is one of great technical advances. Not only has the industry accepted and adapted to its own use the new ideas of science, but it has made fundamental research in great laboratories an integral part of the industry itself.

One company which manufactures electrical equipment and apparatus employs 6,000 engineers and 900 chemists, physicists, mathematicians, and other scientists, and is responsible for 8,000 inventions in the past ten years. Another company spends \$20,000,000 a year on research and engineering development activities.

Light and Civilization

Although the telegraph and telephone were the first big commercial users of electricity, it was the incandescent light that made people electric-conscious. We still speak of our electric-light bill despite our refrigerators, deep freezers, stoves, dishwashers, washing machines, vacuum cleaners, and other appliances, and many power companies still retain the word "light" in their names, no matter how large a proportion of their power is used for other purposes.

Progress in lighting seems to go hand in hand with progress in civilization, and the im-

provement in lighting proceeds apace, since there is an insistent demand for higher levels, or greater intensities, in illumination. It is said that homes, schools, stores, offices, and factories need from four to seven times more artificial illumination than they now have.

Returning servicemen not long ago forced the council of the Tesuque Indian Pueblo, 10 miles north of Santa Fe, New Mexico, to wire for electric lights. One faction of a group of Pennsylvania Amish, the fundamentalists, moved to a new location because another faction, the modernists, insisted upon having electricity for lighting, although even the modernists drew the line at the use of power!

Nearly two billion electric lamps are produced in this country annually, and one company alone makes more than 10,000 different kinds and sizes of lamps.

Amazing Variety of Uses

The electrical industry is comparatively young and new, and yet its growth has been in giant, breath-taking strides. The use of one appliance generally leads to another, and as appliances become cheaper and more reliable there seems no limit to their variety and extent of use.

Especially since the close of World War II the whole world has become electric power hungry, with Western Germany and the 16 nations in the Marshall Plan proposing to install 31,826,340 new horsepower of generating capacity. As of August 1, 1948, the central station generating capacity in the U. S. was 54,293,205 kilowatts, or 72,752,894 horsepower.

The striking thing about electric power is the way it weaves itself into the whole fabric of our lives; consequently, this puts an increasing responsibility upon those who generate and distribute it.

The housewife might get along without an electric curling iron, toaster, or even vacuum cleaner and dishwasher. But electric power fans the oil into the firebox of an oil furnace and ignites it. Thus, in winter, millions of householders in cold climates must look for the protection of their heating systems to companies that for the most part never thought of trying to promote the sale of oil furnaces!

In radio and television, in air conditioning, in familiar appliances and gadgets for home, office, and factory, and in numerous other ways, electricity plays an increasingly important role.

Just imagine a modern hospital or even a large modern doctor's office without elec-

tricity—that is, without light, X-ray (page 661), electrocardiograph, and the varied equipment for electrosurgery and physical therapy, including diathermy and the various kinds of ultraviolet and germicidal lamps.

If we go out on the farm we find several hundred applications of electricity, including milking, cooling, sterilizing, brooding, incubating, sheepshearing, silo unloading, feed cutting, soil heating, hay drying, corn shelling, feather picking, and germ and insect killing (pages 663 and 664).

Turning from the farm to our largest city, the Consolidated Edison Company of New York furnishes electricity for street, highway, park, and bridge lighting; traffic control signals; high-pressure water pumping for fire protection; fire and police alarm systems; for pumping for the city's water supply system and sewage disposal plants; for hoists in the docks; the Independent, or Eighth Avenue, subway system; the Third Avenue Railway; the New York Central, the New York, New Haven and Hartford, Pennsylvania, and Long Island Railroads in the New York area; the tunnels under the Hudson River at the Manhattan end; the telephone and telegraph companies; radio stations, movie theaters, libraries, schools; State and Federal buildings; hospitals; and the nearly 44,000 elevators, which carry 3 billion passengers a year in Manhattan alone; nearly 2,300,000 dwelling units, some 19,000 stores and loft buildings, 1,700 office buildings, and nearly 9,000 factory buildings, including some 26,000 manufacturing establishments.

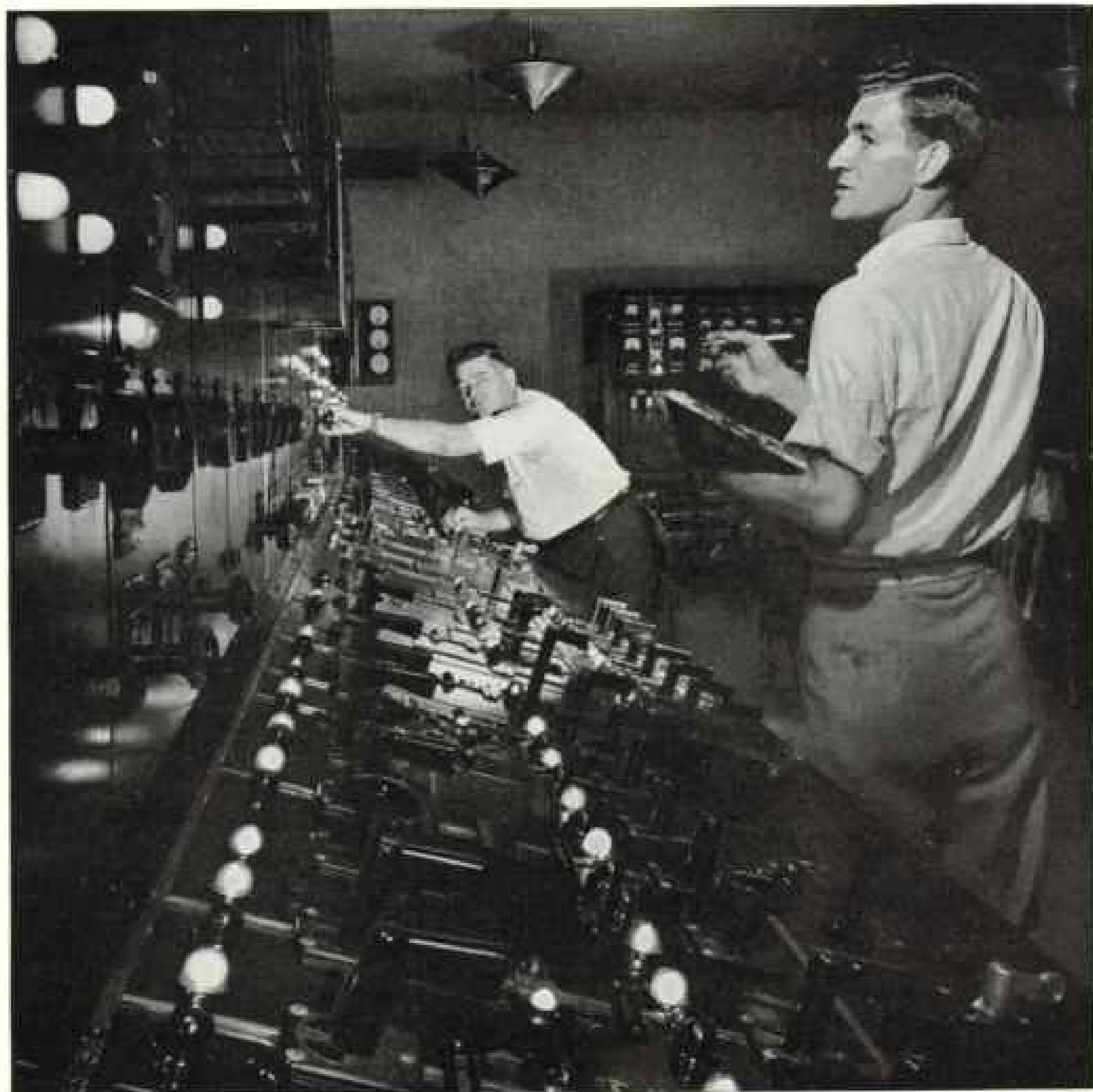
Electricity in Strange Places

Electricity is used in surprising places in large quantities—at the David W. Taylor Model Basin, Carderock, Maryland; at the laboratory of the National Advisory Committee for Aeronautics in Cleveland, Ohio; and in the new Battery-Brooklyn Tunnel in New York City, which will use for ventilation, lighting, traffic and safety control as much current as a city of 20,000.

We know, of course, that practically every factory and mine uses electricity in some form, that it has become an integral part of many of the greatest industries, especially the newer ones, and that it touches and assists in almost every product we use.

The low cost of electricity, the lack of domestic servants, and the constant rise in farm and industrial wages are steadily driving the home, farm, and factory to motorize or mechanize every possible operation.

Despite some recent increases in rates, due to higher costs of materials and labor, the



National Geographic Photographer Justin S. Locher

They Keep Close Watch on the Surging Electric Pulse of the Nation's Capital

Through this control board of the Potomac Electric Power Company flows electric energy for Washington, D. C. After dispatchers estimate each day's power needs on the basis of weather forecasts and other conditions, these operators see that enough electricity is manufactured and fed into the circuits. On the sloping "bench" are circuit-breaker controls that automatically disconnect any power circuit if it becomes overloaded or shorted. Each circuit delivers power to a section of the city or a large individual user. Lights show red if a circuit is closed, green if it is open. Instruments on wall at left tell the load each circuit is carrying (page 665).

average householder continues to get at least twice as much power for his money as he did a quarter of a century ago. In relation to other prices, electricity is one of the cheapest things we buy; technology and mass production have made it so.

Miracles of Electronics

The young wife and mother often cannot get help at any price, but she can and does frequently buy an electric clothes washer, a dryer, dishwasher, toaster, and coffeepot.

One of the newer manifestations, or adaptations, of electricity, known as electronics, is fast leading us into a world of wonders and miracles that fairly defies the imagination.

It is based on the electronic tube, which is essentially the same as the tubes in your radio set.

Current comes into the tube on a wire and goes out on a wire, but while it is crossing the open space inside the tube it is subject to a delicacy and power of control and amplification far greater than in a wire.



Wide World Photos, Inc.

When Electricity Fails, Civilization Reverts to Oil Lamp and Candle Days

Pittsburgh housewives jam a store to buy kerosene lanterns in anticipation of an electric power shutdown resulting from labor troubles. So universal is the use of electricity that hospital operating rooms, telegraph offices, telephone exchanges, and other vital public services and industries maintain emergency power-generating units to which they can switch over in case of failure of the regular electric system.

While experimenting with the incandescent lamp in 1883, Edison observed that when he put a metal plate inside the bulb, a current passed across space from plate to lighted filament. He made a note of the matter but did not follow it up.

Later on, other scientists found that the "Edison effect" was due to passage of electrons from filament to plate.

In fact, for 21 years Edison's discovery, one of the greatest of mankind, lay idle, one of those curious intervals of science. Then in 1904 Prof. John Ambrose Fleming, an English physicist, devised a detector, and two years later Lee De Forest added a grid, or metal screen, which made the radio tube possible.

This is not the place to describe the miracles of electronics; the subject was treated in the NATIONAL GEOGRAPHIC MAGAZINE for October, 1945, by F. Barrows Colton in an

article entitled "Your New World of Tomorrow."

But in almost every field of industry and science the electronic tube is performing amazing tasks, and none seem too complicated, too heavy, too precise, or too fast for it. Like other branches of electricity, it is revolutionizing the world.

How strange that nearly one hundred years ago Nathaniel Hawthorne should have written these words in *The House of the Seven Gables*:

"It is a fact—or have I dreamt it—that, by means of electricity, the world of matter has become a great nerve, vibrating thousands of miles in a breathless point of time? Rather, the round globe is a vast head, a brain, instinct with intelligence! Or, shall we say, it is itself a thought, nothing but thought, and no longer the substance that we dreamed it!"

Sailing with Sindbad's Sons

BY ALAN VILLIERS*

With Illustrations from Photographs by the Author

EVER SINCE the day I thrilled to my first sight of a dhow speeding down the Red Sea, I knew I could never be satisfied until I learned how the Arabs sailed their ships, where they went, and how they survived in a mechanized world.

A look around the maritime world offered nothing of interest to compare. In the Occident scarcely a fisherman was left without power, and few were the South Sea Island schooners that didn't leave the reek of Diesel oil astern.

Only the deepwater Arab, the odd Chinaman with his junk, the long-voyage Indian dhow, and the Makassar prau still went about their ancient seaways under sail.

So, having sold my own full-rigged *Joseph Conrad*, off I went to ship with the Arabs. I went armed with introductions to political agents and to sheikhs, and with visas filled with strange hieroglyphs. A ship owner at Aden arranged for me and an American companion, Hilgard Pannes, to ship in a tiny double-ended dhow.

I discovered that the Arabs speak of none of their ships as "dhows." These craft have type names—*sambuks*, *booms*, *baggalas*, and *zarooks*—depending on hull forms.

The *Sheikh Mansur*, to which I was assigned, was a zarook, built in the Yemen. She was lean and fast, and when I joined her at the little wharf at Ma'ala, Aden, she had just loaded general cargo for Qizan, a small port on the Red Sea (map, page 678).

The ship was so overloaded, her midship rail only a few inches above water, that I feared the wash of a fast rowboat might swamp her.

Arabs Laugh at Foreign "Softies"

Arab sailors and stevedores on the wharf eyed Pannes and me with interest as we approached Ahmed, the *nakhoda* (master) of the *Sheikh Mansur*. Despite language difficulties, it became apparent that the *nakhoda* did not want us, no matter what the owners said. To all and sundry he shouted that his ship was without comforts for softies such as we.

"Look here," I said, "don't you worry about us; we're sailors."

Sailors? Two foreigners in white suits? Laughter swept the wharf.

At last we persuaded the *nakhoda*, and he

marched us off to sign aboard. At the sight of us, pariah dogs on Ma'ala beach barked themselves hoarse. Across the harbor, sand shimmered under the Arabian sun. Behind us the pock-marked mountains, burned and bare, shut in the settlement. A Bedouin camel caravan, hauling firewood, shuffled past us. All along the beach Arab shipwrights repaired dhows and sailors sewed lateen sails.

At last we came to the water-front police office, where we were entered on the *Sheikh Mansur's* outward manifest.

Bearded Pilgrim Comes Aboard

I got a Persian carpet (made in Birmingham) and bedded down on the ship's deck.

Early the next morning a bearded Indian holy man, bound on a pilgrimage to Mecca, came aboard.† This dignitary, wearing a Joseph-coat gown, was escorted by police, who wanted to make sure that he did not become a public charge in Aden. His luggage consisted of a kerosene can crammed with food. Of cash he apparently had none, and he later jumped ship.

That evening, with wind and tide in our favor, we sailed. This maneuver was accomplished by weighing the grapnel anchor by hand and then sheeting home the lateen sail, which broke out of its palm fronds and, catching the air, sent us bowling along.

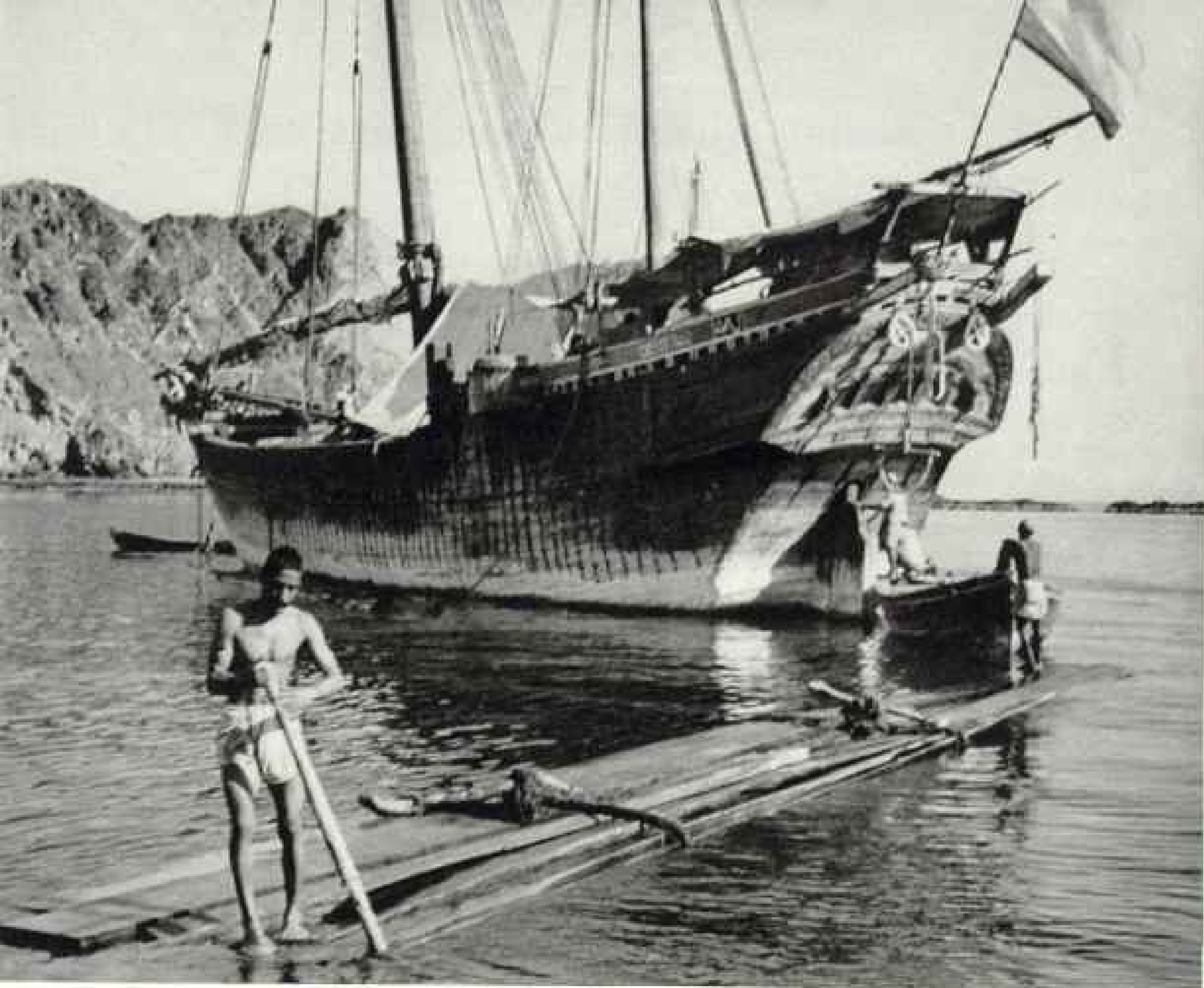
The *nakhoda* took the tiller (there was no wheel), and we slipped silent and lightless down Aden's bay.‡ We ghosted along Arabia's arid shore, bound toward the strait of Bab el Mandeb.

Sheikh Mansur was deep-laden and stiff, and she rolled with a sudden jerky motion. Though the sun was blazing, it occurred to no one to erect a tent shelter.

* The author, an Australian journalist, served under sail in the Australian grain races. Later he became the owner and master of the square-rigged *Joseph Conrad*. During the war he was a commander in the Royal Navy. To the NATIONAL GEOGRAPHIC MAGAZINE he has contributed: "Cape Horn Grain-Ship Race," January, 1933; "North About," February, 1937; "Rounding the Horn in a Windjammer," February, 1931; "Where the Sailing Ship Survives (Åland Islands)," January, 1935; and "Last of the Cape Horners," May, 1948.

† See "Pilgrims' Progress to Mecca," 40 ill., NATIONAL GEOGRAPHIC MAGAZINE, November, 1937; and "Unbeliever Joins the Hadj," by Owen Tweedy, June, 1934.

‡ See "Rock of Aden," by H. G. C. Swayne, NATIONAL GEOGRAPHIC MAGAZINE, December, 1935.



Stevedores in Loincloths Cast Cargo Overboard, Lash It onto Rafts, and Pole It Ashore

This old baggala, flying the Iranian flag, unloads Indian teak in Matrah Bay, Oman. She looks not unlike a caravel; indeed, native skippers told the author that baggalas had been copied from the Portuguese. This example is distinguished from the double-ended boom by the high poop deck overhanging the windowed cabin. She is one of the last of her kind, as the flat stern has proved too vulnerable to following seas. Here an old sail is folded across a yard as a tent.

After a long hungry day, we anchored late at night in a tiny cove under Perim. Before dawn we were off again. For the next week our routine was the same: we sailed by day and anchored by night. Nocturnal navigation was too dangerous, for the waters were full of reefs, which we had to avoid by eye.

Sheikh Mansur made a lot of water, most of which drained into the rough well abaft the mainmast. Into this foul cavern a man or a boy descended each hour and bailed as if for his life, passing up a kerosene tin or goat's skin to be emptied overboard.

Palm matting lashed along above the sides proved a surprisingly effective barrier to the waves. Though the freeboard amidships was not much more than six inches, we shipped little water over the sides.

We had just the one big mainsail. In a stiff breeze its area could not be reduced by reefing; we had to lower the lateen yard and

then bend another, smaller sail—an enormous amount of labor.

When the ship went about, head to wind, the heavy yard had to be shoved from one side of the mast to the other. On anchoring we lowered the sail to make sure that it did not blow overboard.

There was no standing rigging. Each time sail was trimmed, a lot of the rigging had to be taken down and set up again.

Our Ancestors Sailed Such Ships

Our little vessel was planned and manned much as she might have been in Bible days. She was built entirely by eye, blueprints being unheard of, and the cost did not exceed a few thousand dollars. For years her awkward triangular-type sail was the world's standard equipment. The square sail, so obsolete compared with a mechanical engine, is, in fact, modern indeed beside the lateen.



Bayan's Crew, Rejoicing at the Sight of These Grim Hills, Hoists the Kuwait Flag

Nearing home after the long voyage to Africa, the boom stopped at Matrah, on the Gulf of Oman, in hope of selling her cargo. The peak of her jackstaff bears a small airplane, an emblem popularized along the Persian Gulf by British flying boats, which made it a base.

From the start I tried to learn all I could about shipboard routine, but for a while I was unable to discover any. The wind blew and the ship sailed, and if Allah were kind she arrived. Allah sent the winds, good and bad.

In unfavorable weather the ship anchored until Allah changed his mind. Since Allah controlled all things, the men argued, there was no sense trying to predict the weather. As Allah took care of the future, marine insurance was unnecessary.

Crew members offered up their five prayers daily. They slept. They steered. Sometimes they looked after the sail. This was the sum total of their lives. They were a merry crowd for all that, and life on board was really not bad, despite the rats and obnoxious insects.

Nakhoda "Sounds" with a Fishing Line

Though our small wanderer was leaky, overloaded, and overcanvased, she sailed along pleasantly between reefs and other hazards.

Sheikh Mansur was as primitive a craft as I have seen in deep water. Compared with her, a Tasmanian ketch was as lavishly equipped as the *Queen Mary*.

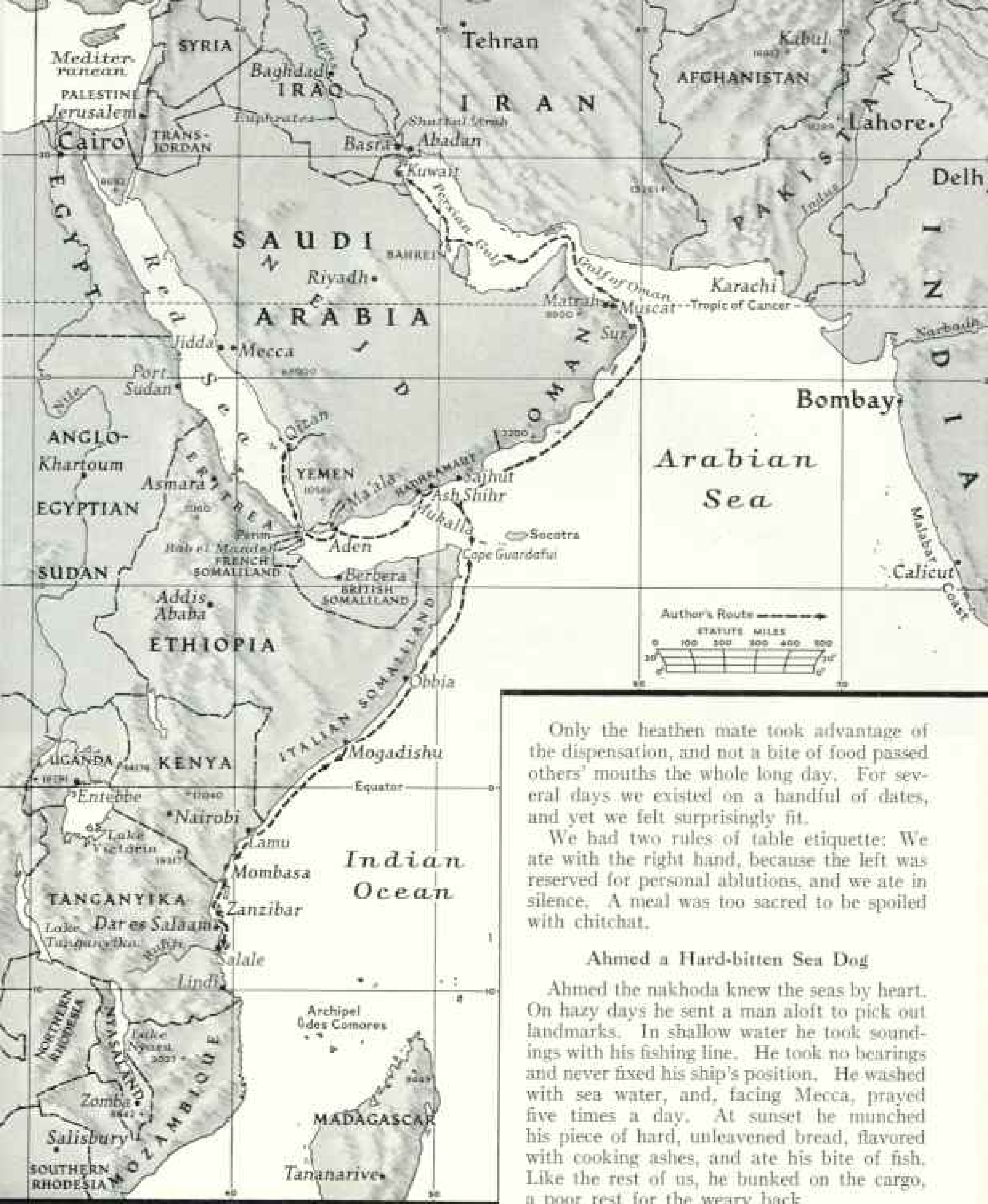
The *Sheikh* had no windlass, and no anchor save her rusted, four-pronged grapnel. Her small boat was a risky-looking dugout. There was no deck of any kind above the cargo.

The only navigation instrument was the ancient, battered boat compass. Charts, barometer, log, and pump were missing. There was no device for telling time. We lacked even a lead line for sounding, though sometimes the nakhoda used a weighted fishing line.

No Arab aboard could write, and only one could read.

Sea stores were kept in one small box, from which they soon disappeared. Our larder was replenished by a fishline trailing over the stern. For cooking we carried a small sand box and a native firebox. Camel's-thorn firewood was salvaged from Red Sea cays and driftwood from the sea.

Our food situation, bad enough in any case, became worse during Ramadan, the fasting month, when good Moslems are supposed to starve and thirst from daylight till dark. Sailors do not have to observe the fast while at sea; they are required to fast an equivalent number of days at the voyage's end.



In These Waters Araby's Argonauts Preserve Antiquity's Lateen Sails

Each year's date harvest sends the sailor-merchants of Kuwait venturing down the Persian Gulf to East Africa's ports seeking the highest market. When the prevailing monsoon changes, giving them a fair wind north, they stuff their galleonlike dhows with coconuts, mangrove poles, and silver thalers and return home. For a year the author shared the sea Arabs' wanderings. His route, the composite voyage of two ships, began in Aden and ended in Kuwait.

Only the heathen mate took advantage of the dispensation, and not a bite of food passed others' mouths the whole long day. For several days we existed on a handful of dates, and yet we felt surprisingly fit.

We had two rules of table etiquette: We ate with the right hand, because the left was reserved for personal ablutions, and we ate in silence. A meal was too sacred to be spoiled with chitchat.

Ahmed a Hard-bitten Sea Dog

Ahmed the nakhoda knew the seas by heart. On hazy days he sent a man aloft to pick out landmarks. In shallow water he took soundings with his fishing line. He took no bearings and never fixed his ship's position. He washed with sea water, and, facing Mecca, prayed five times a day. At sunset he munched his piece of hard, unleavened bread, flavored with cooking ashes, and ate his bite of fish. Like the rest of us, he bunked on the cargo, a poor rest for the weary back.

The skipper was a lean, bearded Yemenite of 35 years, 30 of them spent at sea. Jidda in the north, Saihut in the east, and Berbera in the south marked the limits of his wandering. Red Sea waters were as familiar to him as the well-lit streets on any suburbanite's homeward way. He knew such things as he needed to know, and nought else bothered him.

At sea the nakhoda dressed always in the same clothes—a short sarong, gathered at the

waist and hanging to his bony knees. In the pockets of his gold-cloth waistcoat he carried the ship's manifest and all her papers, together with all the letters, notes, and bills of health he ever received. Beneath this coat he wore a Japanese singlet, copiously ventilated.

Carries His Amber Rosary Ashore

Ahmed kept his money belt lashed tightly about the waist. A small cap of white crochet was set far back on his head, and round this he bound his blue and gold turban. He had no shoes. When going ashore, he carried a rosary of amber beads.

The nakhoda's disposition usually was placid, and his face knew more peace than some bishops'; but when excited he yelled at his crew in jerky sentences. His eldest son sailed with him.

Four men and four boys comprised the rest of the crew. They included a Turk, who must have been over 70, and the nakhoda's Negro slave, who knew neither his age nor the country of his origin. Slavery did not trouble the Negro; he prayed to Allah and seemed as content as any man aboard. Crew members regarded their fellow man's bondage with complacency.

Day after day we wandered northward past the Yemen shore.* Sometimes we landed for the night on a cay where piles of oysters lay opened for their pearls, and sting rays and sharks scavenged the shallows.

Sometimes we spoke to fishermen and bought a mess of fish for a handful of rice. Other dhows crossed our track, but no steamers; this was not their lane.

* See "Yemen—Southern Arabia's Mountain Wonderland," by Harlan B. Clark, NATIONAL GEOGRAPHIC MAGAZINE, November, 1947.



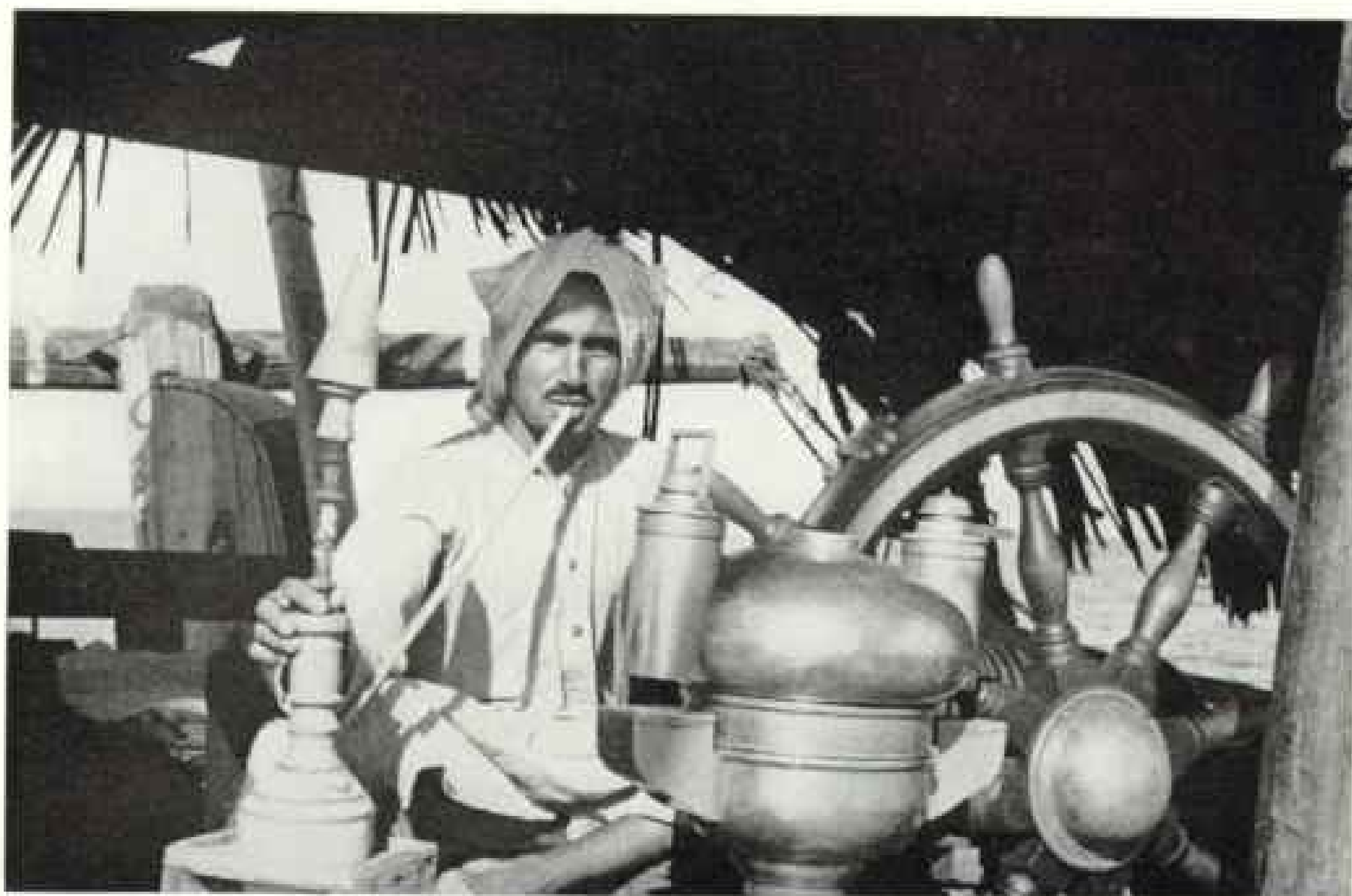
Like Monkeys in Treetops, Arabs Climb a 130-foot Yard

Three tree trunks, lashed end to end, compose *Bayan's* lateen yard. These lashings and those on the sail provide precarious foothold. The author tried this climb once, and once only. These men are unaware of such luxuries as ratlines for ease in "laying aloft."



Shoes? *Bayan's* Men Climb Barefoot. Caps? The Fiercest Sun Never Bothers Them

Dhows provide no footropes nor any form of protection for work aloft, yet accidents are rare, so agile are the sea Arabs. Scorning use of capstan and other devices, they hoist the sail and swing the yard by hand. Some are slaves or sons of slaves. Heavy rigging is made of coconut-busk fiber from India.



In Awninged Ease Sits the Quartermaster Nonchalantly Puffing His Water Pipe

Navigation is simple on an Arab dhow. No one takes sights with a sextant; no one bothers with a chronometer (very few aboard know the day, much less the second). The helmsman simply takes a sight on the shore, which is seldom out of view, and steers accordingly. *Bayan's* compass is housed in a smart brass binnacle, which, like the wheel, was bought in a Bombay junkyard.

The fort-surmounted headland of Qizan came into sight. Ahmed brought his charge smartly to her anchorage. From the dim cockroach-ridden recess beneath the tiny poop his son passed up to him a fresh set of clothes. In these he received the boarding officers, who were dressed in the stately long white gowns, white headcloths, and gold-wired black *agala* (head cords) of Saudi Arabia. *Sheikh Mansur's* passage was done.

I saw Ahmed the nakhoda only once again, in Qizan's police headquarters. The chief, neat, dapper, and suspicious, sat at his desk, his silver-mounted pistol resting in its decorated holster.

Before him stood Ahmed, beads in hand, humbly waiting his turn to ask whatever favor he wanted. In the presence of so much official dignity he seemed bewildered.

Good Ahmed! I liked him well. He treated us, infidels and nuisances as we must have seemed to him, with every consideration. For his crew and his decrepit little ship he always did his best. He was a good sailor.

Pannes and I wandered back to Aden, where we found the Kuwait and Sur fleets unloading the new season's crop of Iraqi dates from the valley of the Shatt al 'Arab.

Of all Arab dhows, I thought the big Kuwait booms had no equals for beauty, sound construction, seaworthiness, and ease in handling. We counted 20 of them, including some hauled up dry on Ma'ala beach for bottom-scraping and painting with camel fat and lime.

It was not easy to get a passage in one of these dhows. The Arab, though hospitable to a fault, still dislikes the infidel in his midst and hesitates to reveal too much of his business, some of which may be devious.

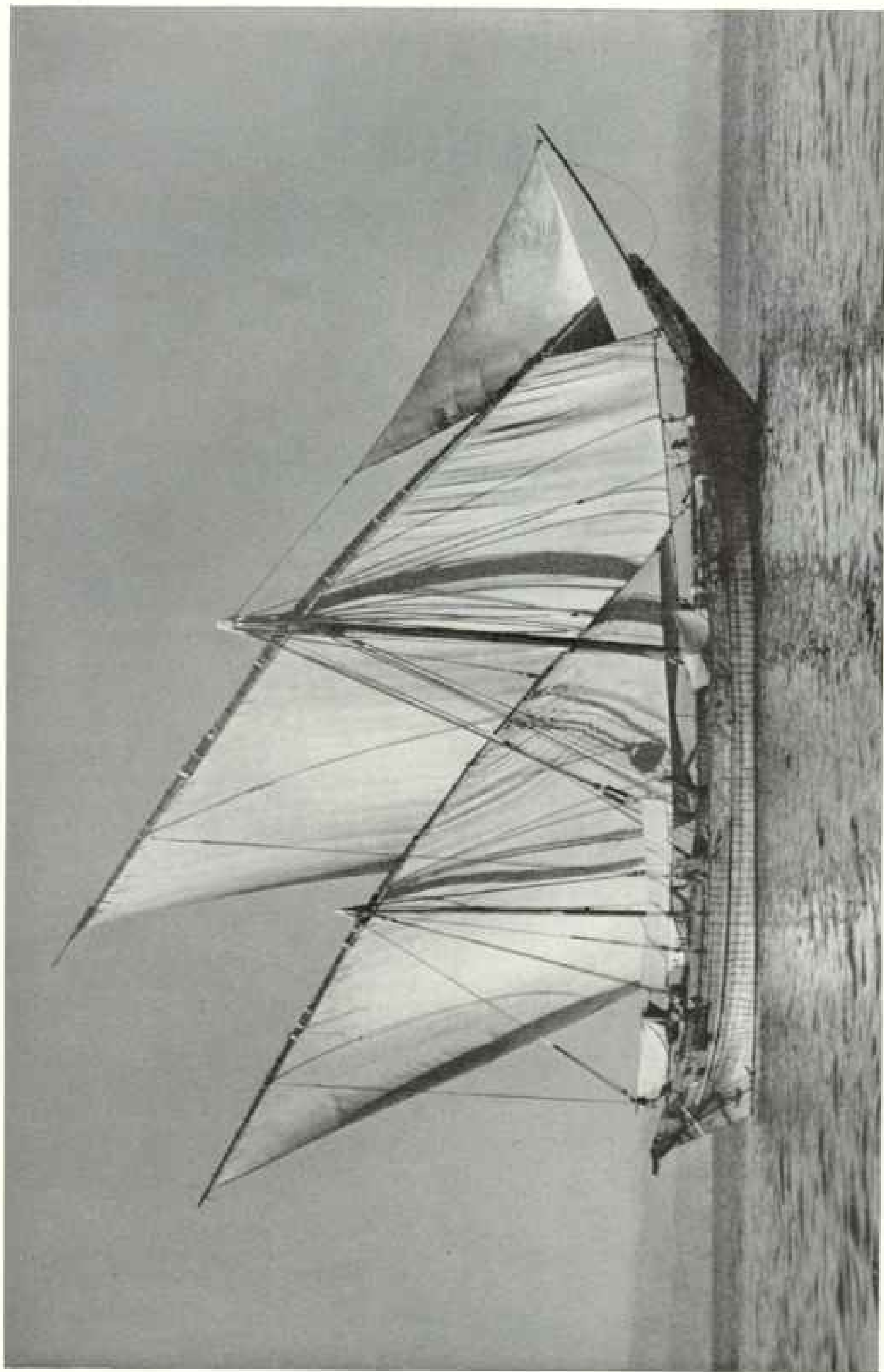
However, I at last quieted the suspicion that I was a customs inspector and, saying good-bye to Pannes, shipped aboard a 115-ton Kuwait boom.

Bayan's Men Beat Drums, Sing Chanteys

Her name varied from time to time, depending on where she was, for like other Arab ships she did not like to be identified too closely. Sometimes she was the *Nejdi*, but generally the *Bayan* (page 682).

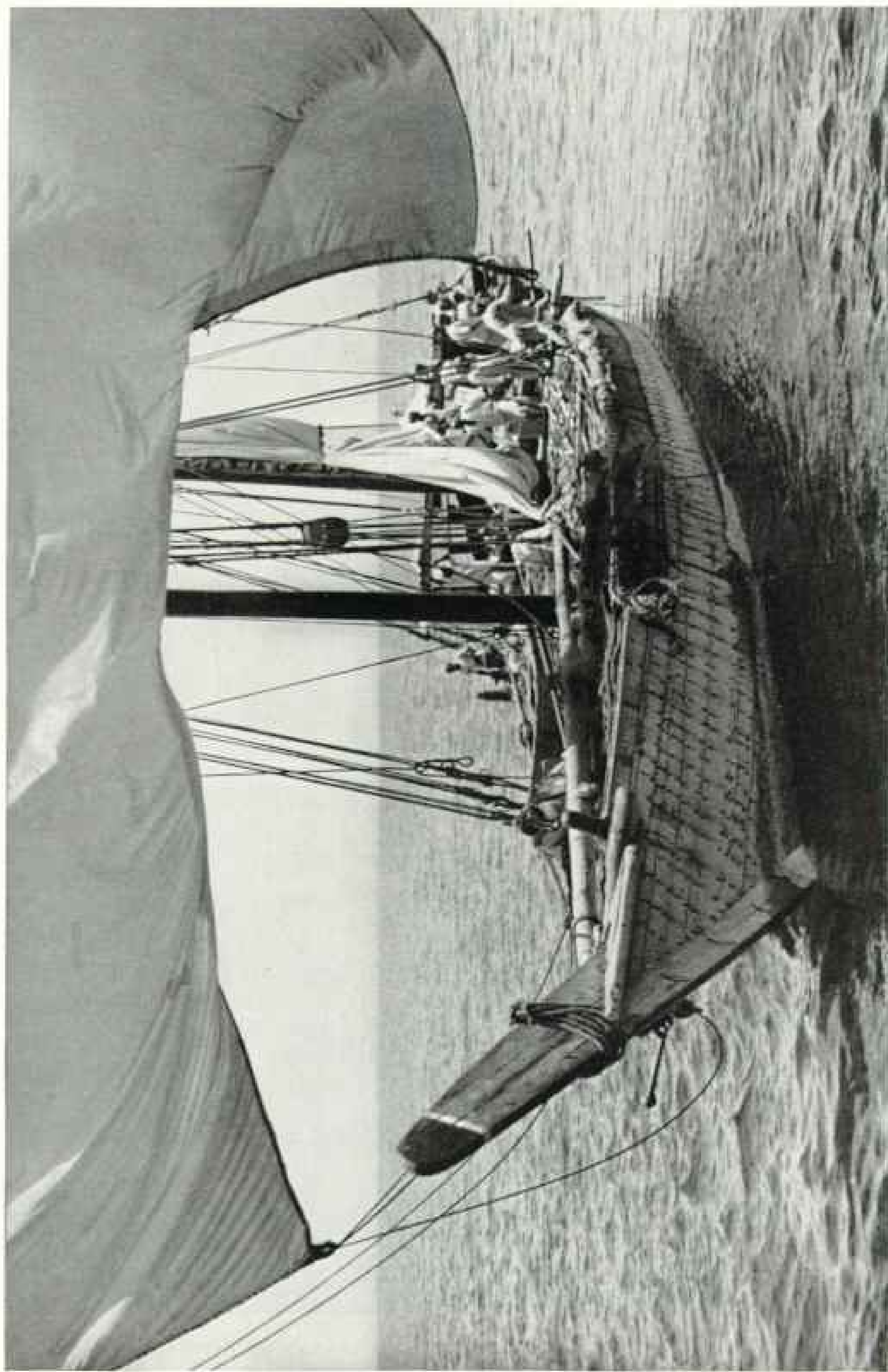
When we rowed out to *Bayan* in her long-boat, the sailors beat drums and sang chanteys, as is their custom.

Ali bin Nassir Nejdi, the nakhoda, was bound on a trading voyage along the coast of the Hadhramaut, thence to Zanzibar and



Bayan, a Winged Galleon of Araby, Lies Becalmed in the Gulf of Oman Though She Flies Every Inch of Canvas

Aboard this stately vessel the author, a veteran of square-rigged ships, lived as a son Arab to make a survey of latent sails. During an adventure-packed voyage he learned how the Basra date harvest and the changing monsoons govern the sailors' yearly schedule. Deck awnings provide some shelter from the sun.



Baryan Gets Under Way. Her Huge Lateen Mainsail Bellies in the Monsoon; the Idle Mizzen Is Furled at the Mast

Arabi's lateen (triangular) sail, forerunner of the square sail, is too clumsy for close work in harbors, and is inefficient in tacking. But, given an advantageous wind, it is a work horse matched by no other sail. On one fair day *Baryan* sailed 250 miles. Here she displays the long teakwood nose of a typical Kurwait boom.



A Human Fender Disengages Pilgrim Dhows Arriving in Jidda, Port of Mecca

Wanderers to Islam's holy city endure incredible crowding. Passengers aboard the author's dhow utilized the last inch of space. In the confusion, the ship's officers had only one rule: the passenger was never right.

Tanganyika, and homeward to the Persian Gulf. He assigned me to be his navigating mate, surely a nominal job, and gave me a six-foot length on the nakhoda's bench in the stern, but no chronometer or any charts.

I assigned to myself the tasks of learning all I could, of understudying the second mate, and looking after the health of all hands.

Like most Arab ships, *Bayan* carried no medicines or dressings; so I brought aboard all I could afford. I found plenty of use for them.

There's No Privacy Aboard a Dhow

Bayan, built of seasoned Malabar teak and boasting a crew of 27 men, was indeed a veritable liner compared with the poor little coasting *Sheikh Mansur*.

She was only four years old. Her mainmast was an 80-foot tree, and the lateen yard consisted of three Persian trees lashed together, the whole more than 130 feet long (page 679).

Our ship was double-ended with a high, roomy poop. Her gear was stout and good. The low, keen bow was surmounted by a long nose in polished teak, the mark of all Kuwait booms (page 683).

For the sake of any who may wish to take the voyage, I feel duty-bound to point out a few disadvantages. A galaxy of insect and rodent life promised poor company.

Cooking arrangements were not much better than the little zarook's. All life had to be lived in full public view. Fresh water was kept in two wooden tanks into which all hands dipped at will; I was glad to see they seemed healthy.

Water, I learned later, was taken in the cheapest possible manner—from streams and mosque wells—and dumped into the tanks, which were never cleaned. A cast-iron stomach is requisite for any dhow sailor.

Sea Arabs Have No Use for Schedules

With a full cargo of salt, grain, tinned *ghce* (semiliquid butter), and cased goods, we set out on a December morning bound for Mukalla and Ash Shihr, in the Hadhramaut.*

Our ship was under the command of the mate, Hamed bin Salim, for Ali the nakhoda had gone ahead to Mukalla to collect a band of passengers.

I discovered that nakhodas often cheerfully left their ships and went ahead. Merchants as much as commanders, they had to purchase and sell cargoes and look for passengers.

As the ship carried her own goods for sale in the highest market of the moment, we found it impossible to forecast all our ports of call.

Not even the nakhoda knew precisely where he was bound.

For 10 days an adverse wind slowed our progress. During this time I became acquainted with the crew. *Bayan's* men from the start were kind to me, though they did show an embarrassing interest in all I did. Before long I was able to make friends despite my feeble Arabic.

To my regret, these Kuwaitis spoke a different idiom from the Yemenites aboard *Sheikh Mansur*, and for a while I scarcely understood a thing.

The food, though rough, was better than the zarook's. We had aboard several Somali goats. Once a month one of these was killed, skinned, and thrown into the pot. Often we ate dried shark; I found it dreadful.

My stalwart companions were marvels of energy (page 680). The amount of singing, chanting, yelling, grunting, and other noise-making they succeeded in creating would have exhausted the ordinary seaman. Almost every task they performed with a song and dance.

These Kuwaitis were magnificent specimens. Many were deep-chested pearl divers from the Persian Gulf. We had a number of freed slaves, huge muscular Negroes.

Sindbads Gloat Over Their Treasures

All these fellows obeyed orders on the instant and at the run, so that the boom's daily chores were done as effectively as a liner's.

Every hand had years of experience. All had been at sea since boyhood, first on board Gulf pearlers, later on coasters, and finally on big booms and baggalas.

Paid on shares, the men took an interest in seeing that the vessel made a productive voyage. In addition, each man was allowed to bring a chest of his own wares, as in ancient times, when each merchant carried his goods and helped sail the ship.

These chests, teakwood boxes from Bombay and Malabar, stood ranged round the elevated poop, and in them lay all manner of cheap manufactured goods bought at Aden for sale to Somalis and Swahilis.

When there was no work afoot, the sailors loved to crowd up on the poop and examine the treasures in their chests, one man turning out his wares, his friends admiringly pawing them, guessing their price in Mogadishu, Salale, or Lamu. I could visualize Sindbad and his companions doing the same.

* See "Into Burning Hadhramaut," by D. Van der Meulen, NATIONAL GEOGRAPHIC MAGAZINE, October, 1932.



Sea Arabs, Shaded by the Sail, Coil Up on a Cordage Mattress, the Only Bed They Know

Their pay is a pittance and their food poor, yet they are cheerful. Hoisting sail, they work like fiends, but when there is nothing to do they have an immense capacity for doing it. In a fair wind they seize this opportunity of catching a daytime nap. At night, when navigation ceases, they bed down on the deck and cover up with the stars (page 658). "Bed-springs" are mangrove poles taken from the Rufiji Delta in East Africa.

On the eleventh night out of Aden we came into Mukalla. It was a grand place to look at—houses and mosques squeezed between mountains and sea. Here we shipped the nakhoda's passengers, 40 Bedouin emigrants to Somaliland, Africa.

I discovered that all the Africa-bound dhows carried 50 to 200 passengers—wandering Hadhramis going to Kenya, Tanganyika, or Zanzibar in quest of fortunes their own harsh land could not give them.

When Hamed remarked that we would load a hundred more passengers, I felt sure he was exaggerating. That was nothing, he said; the boom had carried 260 on her previous voyage.

Our Bedouins brought their women with them. These poor creatures were bundled into

the smelly, cramped "great cabin," a frightful place beneath the poop, unlit and unventilated. Here 14 pathetic, docile bundles wrapped in black had to stay cooped up for the next six weeks with their babies and baggage. They had no comforts save a few date-frond mats.

A Walled City Facing the Sea

From Mukalla we went to Ash Shihr, a walled city facing the Arabian Sea. While lying at anchor in the open roadstead, we took on board another hundred-odd Arabs, each carrying his food for the voyage. A few hung their belongings over the ship's sides.

Some of our Hadhramaut Arabs were seasoned travelers, having voyaged as far as Java, Syria, Mombasa, and the Sudan. Others

were unsophisticated, wild Bedouins leaving their desert homes for the first time. Gaping at every activity, they never became accustomed to shipboard life.

They were a tough-looking lot. As I watched them milling about the deck, mingling with the mob we already had, I worried about our water supply, sanitary conditions, and my own precious health.

Each man cooked his evening meal on the deck. I was still wondering where all 170 of us were going to sleep when I saw the newcomers, one by one, selecting deck-plank bunks under the stars. Not one complained of his hard couch. This I know: the Arab, traveling at sea, can rest his bones upon the space ordinarily occupied by a clothesline, and his capacity for tolerating hardships seems unlimited.

Seasick Passengers Pray, Rush to Rail

We were bound now for Africa. To my surprise, we reached the continental coast within three days. For only one day did we lose sight of land. The Arab mariner likes to keep the shore in sight as much as possible.

Though the weather was reasonably decent, a few passengers became seasick. Their precautions and remedies were weird. Some stuffed paper in ears and nostrils; others sniffed lemons. Nearly all prayed. All was in vain; there was many a rush to the rail.

Some of our passengers, decent citizens, cooked, ate, and slept without raising a riot, but others quarreled, fought, and yelled until the ship became a bedlam.

We had several blind men going to Zanzibar to beg, and there was a surprising number of wild, mischievous children. No one seemed to be looking after the boys, until some of them fell overboard. Luckily, they were good swimmers.

Although I counted our passengers every day, I was seldom sure how many we had, because whenever we came into a port some of them slipped over the side. The nakhoda, of course, had a list, but when he called off the names he was never certain who was answering "Here!"

Authorities at Mogadishu, our first large port of call in East Africa, took a dim view of our human cargo. They laid down the law: any immigrant not previously resident in Somaliland must go elsewhere.

From the Bedouins, their provisions exhausted, arose a wail of anguish.

But on they had to go, for the days when Arab mariners bossed the East African coast, opening sea routes and founding ports, are gone.

In any port nowadays the first visitors are white-uniformed immigration inspectors to control the ancient movements of peoples, doctors to shut out smallpox, and police to see that the independent Arab pays at least lip service to European laws.

Bayan Does 280 Miles in a Day

Our passengers suffered their disappointment secure in the knowledge that Allah would take care of them. We had to go to Mombasa, in Kenya, before we finally got rid of them.

In Mombasa, a nominal dominion of the Sultan of Zanzibar, the Arab has the last of his privileges. Even our blind beggars were allowed to land. They paid their fare—\$2.50 for a 1,800-mile voyage.

Ali and Hamed heaved sighs of relief on getting rid of the Bedouins who, they admitted, were truly well-behaved compared with others they had known.

Our voyage to Mombasa was made with a steady wind always in our favor. We caught plenty of fresh fish for the pot. *Bayan* sailed so well that one day, with a fresh monsoon and south-going stream, she made no less than 280 miles—very good time indeed.

More than once the nakhoda proved his seamanship. I admired the way he piloted his ship into Mogadishu by night and into Lamu on a falling tide. Hamed the mate was every bit as good.

As to navigation, Ali said, all he had to do was to run down with Africa on his right and then back again with Africa on his left. As for the ports, he knew them by their landmarks.

His maritime knowledge descended from a line of seafaring ancestors going back, no doubt, to the Phoenicians. Ali scoffed at my book learning.

A day and a night out of Mombasa we put into Zanzibar, the Arab headquarters. Here the nakhoda sold the cargo, distributed a few East African shillings to the sailors, and moved ashore.

While we stayed at anchorage for two weeks, the crew bought lemons and made sherbet to their hearts' content. They raised Cain in the Bazaar.

Mud, Mangroves, and Mosquitoes

With visions of romantic places, I hoped that our skipper would find a cargo for the Comoro Islands (Archipel des Comores) or Madagascar. He undertook, instead, a venture to the delta of the Rufiji River to load mangrove poles for sale in Arabia.

Should any wanderer ask you, "Do you want to go to the Rufiji Delta," tell him

"No!" I speak from experience, for I spent a month among its mangroves, mud, monkeys, and malarial mosquitoes. Every insect bite was a stab with a red-hot needle; every scratch festered.

In the Rufiji, flowing out of Tanganyika, the German raider *Königsberg* met her doom in 1915, and we anchored little more than a mile from her broken hull rusting in the mud.

Waters of the many-mouthed Rufiji were three parts water and one part mud. Its swamps were three parts mud and one part water. It rained every day. Crocodiles and hippopotamuses sported by.

The crew worked dreadfully hard cutting poles, and all hands thinned down.

When we sailed, with full cargo, the tired and emaciated sailors thanked Allah.

Back in Zanzibar early in April, we waited for the southwest monsoon so that we could run back to Arabia with a fair wind. That is the way of all these voyagers: they sail south on the northeast monsoon, which fortunately follows the ripening of the Iraqi dates, and homeward on the southwest—always a fair wind, up and down, one voyage a year.

We found 50 big dhows like ours in Zanzibar, waiting for the breeze.

A Cargo of Maria Theresas

Here we loaded coconuts, canned coconut oil, and an odd lot of vermicelli, all of which Ali hoped to sell at a profit in the Muscat bazaar.

We also took on board a few sacks of Maria Theresa thalers, dated 1780, year of the Queen's death, but coined by the Royal Mint in London the previous year, when there was a big demand for them. These heavy silver coins, so prized by the Arabs, we bought at a discount, confident we could sell them at a premium in Muscat.

In addition, we took aboard three Swahili schoolteachers who wanted to see the world. Sailing by night (for the channel was lit), we ran up the coast bound for Muscat on the Gulf of Oman.

The voyage took 24 pleasant days. During this time we spoke many other Arab vessels, from Kuwait and the Hadhramaut and Oman, and saw *katias* homeward-bound to Bombay and booms from Iran. The northbound fleet must have been one hundred strong.

Many vessels traveled in companies because, I was told, of their ancient fear of pirates. At evening they made a beautiful sight sailing together into the setting sun.

So we came to Muscat, but delayed little, for business was dull in that ancient town.

Hearing that it was better up the Persian Gulf, we hurried toward Bahrein Island, home of pearls and petroleum.*

Saudi King Buys Our Lumber

Immediately on arrival we sold our full cargo of mangrove poles to agents of Ibn Saud, King of neighboring Saudi Arabia, for use in the building boom brought on by the oil strikes in the Nejd. The price was good; the Saudi King is no haggler.

Cargo discharged, *Bayan* hurried to Kuwait, her home port, 275 miles from Bahrein. She arrived in June, ten months and 10,000 miles after her departure. The ship was rigged down, beached, and propped up with stilts to rest until a new crop of dates ripened beside the Tigris and Euphrates.

And now I said good-bye to my Arab friends of the last seven months—to Ali; Hamed his mate; Mohammed the boatswain, who sang and danced; old Yusuf Shirazzi, the steward and storekeeper; Kaleel the carpenter; Jassim the cook; and the others. The round voyage meant 10 months' hard work to them, for which the average man's share amounted to \$50.

Their money did not last long. They barely had time to greet their families before some of them were out prowling the Gulf in pearling ships, trying to eke out a living before *Bayan's* next voyage.

For their small wage they toiled in 20 ports, slaved in Rufiji mud, and broiled in Aden. Their sustenance was a mess of rice with such fish as they could catch, and perhaps a bite of meat. Their pleasures were a puff upon the water pipe (page 681), an occasional run ashore. Their beds were deck planks and their covering was the stars (page 686). In their own way they were as good seamen as I have known, and better than most.

A Last, Nostalgic Look at Arab Sails

Not long ago I chanced to be in Aden again. At the Ma'ala anchorage stood several Kuwait booms, laden with Basra dates. Going aboard one, I was entertained with music and song. When my own motor-powered craft took me away, I looked back on the big sailing ships with admiration and, indeed, with some envy for their crews.

Though I suffered injury, hunger, dysentery, and malaria during my year in dhows, I would not trade the experience for a berth in the *Queen Elizabeth*.

* See in the NATIONAL GEOGRAPHIC MAGAZINE: "Bahrein: Port of Pearls and Petroleum," by Maynard Owen Williams, February, 1946; and "In Search of Arabia's Past," by Peter Bruce Cornwall, April, 1946.

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ORGANIZED FOR "THE INCREASE AND DIFFUSION OF GEOGRAPHIC KNOWLEDGE"

To carry out the purposes for which it was founded sixty 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, 307 B. C. (Spinden Correlation). It antedates by 300 years anything heretofore dated in America, and reveals a great center of early American culture, previously unknown.

On November 13, 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 72,195 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.



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TOMORROW: Tremendous power plus long-range capacity . . . how will tomorrow's ships get both? Perhaps the solution will parallel the Navy's new P4M Martin Mercurator patrol plane, powered by two reciprocating engines for long-range cruising and two jets for added power.

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ANOTHER GREAT MARTIN PLANE!

TODAY, on Northwest Airlines, the Martin 2-0-2 is *great news* . . . truly America's top twin-engine airliner! 100 m.p.h. faster than the planes it replaces, it *gains time, time, time* for businessman and pleasure seeker, alike. Its *roomy* cabin features cloud-soft seats, modern heating and ventilating, everything to put you in the lap of luxury. Its dependability is built on such improvements as heated ice-free wings and tail surfaces, rubber fuel tanks. And the great, new Martin 2-0-2 brings high-speed luxury service to *all* cities, large and small . . . through its ability to land in the shortest distance of any postwar airliner!

Revolutionary . . . yes! But no more revolutionary than the Martin MB bomber was in 1918 . . . the Martin BM-1 dive-bomber in 1929 . . . the China Clipper in 1934 . . . the Martin Mars in 1942! For, since Glenn Martin built and flew his first tiny airplane in 1909, the name "Martin" has always been synonymous with imagination, forward-thinking, progress . . . in man's never-ending quest of the skies! The Glenn L. Martin Company, Baltimore 3, Md.



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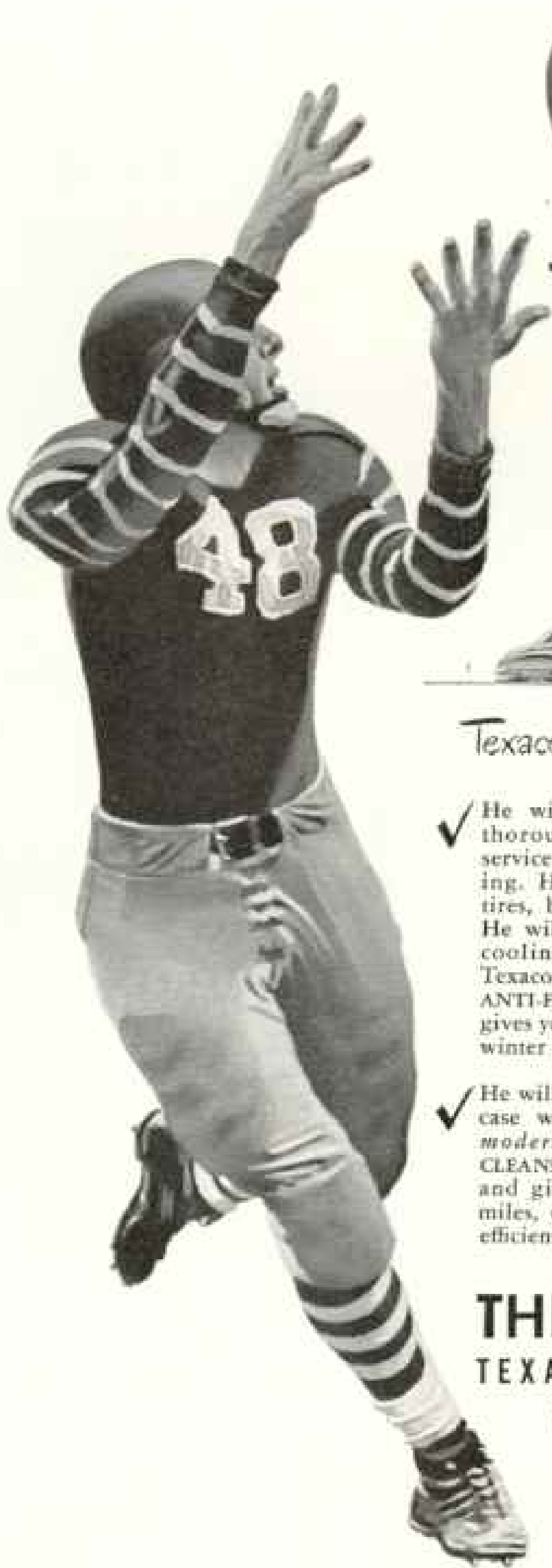


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You'll
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↑ Picture Gorge, hewn into the "Old West" plateau rangelands of East-Central Oregon by the John Day river. The gorge is named for ancient, unexplained pictographs on sections of its basalt walls. In this area are fossil beds and geologic formations millions of years old.

→ Pacific ocean fishing craft make a colorful waterfront sight at Astoria, established in 1811 at the mouth of the mighty Columbia river as a trading post. Today, Astoria is one of the nation's major salmon and tuna canning centers.



ENJOY A VACATION you'll always remember in scenic Oregon. Explore, if you wish, in wondrous gorges, where colored rock walls reveal millions of years of earth history. Choose 400 miles of the Pacific's magnificent seacoast—or drive to fun in mountain-top snowlands. In Oregon's memorable vacation lands, also, are forests of towering evergreens, sparkling streams, tumbling waterfalls and clear lakes. You'll enjoy Oregon in any season. Plan your Pacific Northwest holiday *now!*

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Travel Information Dept., Room No. 88
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Please send your free booklet to:

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This view from Jackson Mountain, Chattanooga, Tenn., is typical of the great and historic South, through which the Southern Railway passes. Among the name trains on this railway are the Crescent Limited and the Southerner, stopping daily between New York, Washington, Atlanta and New Orleans. These and other famous trains on the Southern are powered by General Motors locomotives.

SEE AMERICA FIRST CLASS

TO see America first class, here is the important thing to remember:

Pick out the trains with a General Motors Diesel locomotive up ahead.

Then, regardless of the ticket you buy, you'll travel everywhere — first class. For these General Motors locomotives give a smoother ride. Trains start and stop without annoying jolts or jerks.

You'll make your time count, too,

because of faster "on-time" schedules. And you'll see more because no smoke or steam will mar your view.

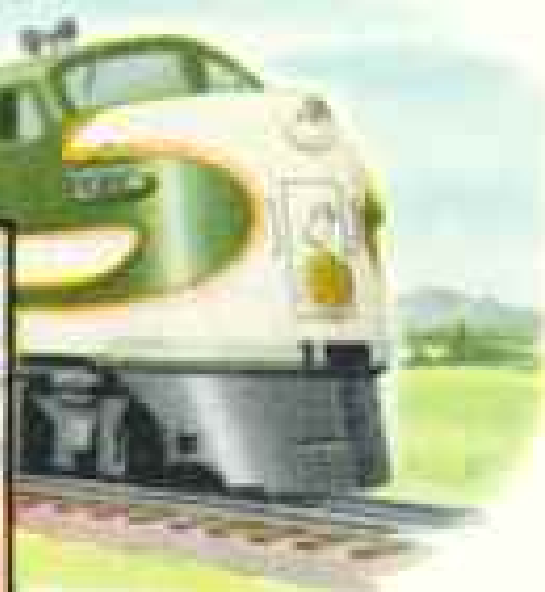
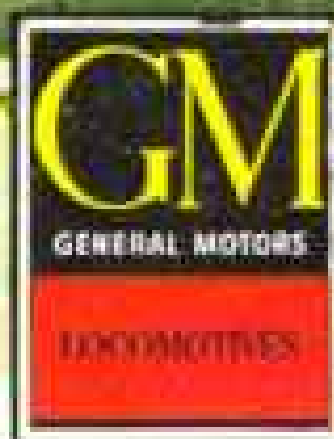
That's why General Motors locomotives are heading 197 of the nation's fastest, finest name trains.

And why smart travelers say, "Better trains follow General Motors locomotives."

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*Presenting a major achievement
in music... the record that
plays up to 45 minutes...*

the sensational new

...finer tone quality

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LP

LONG PLAYING MICROGROOVE

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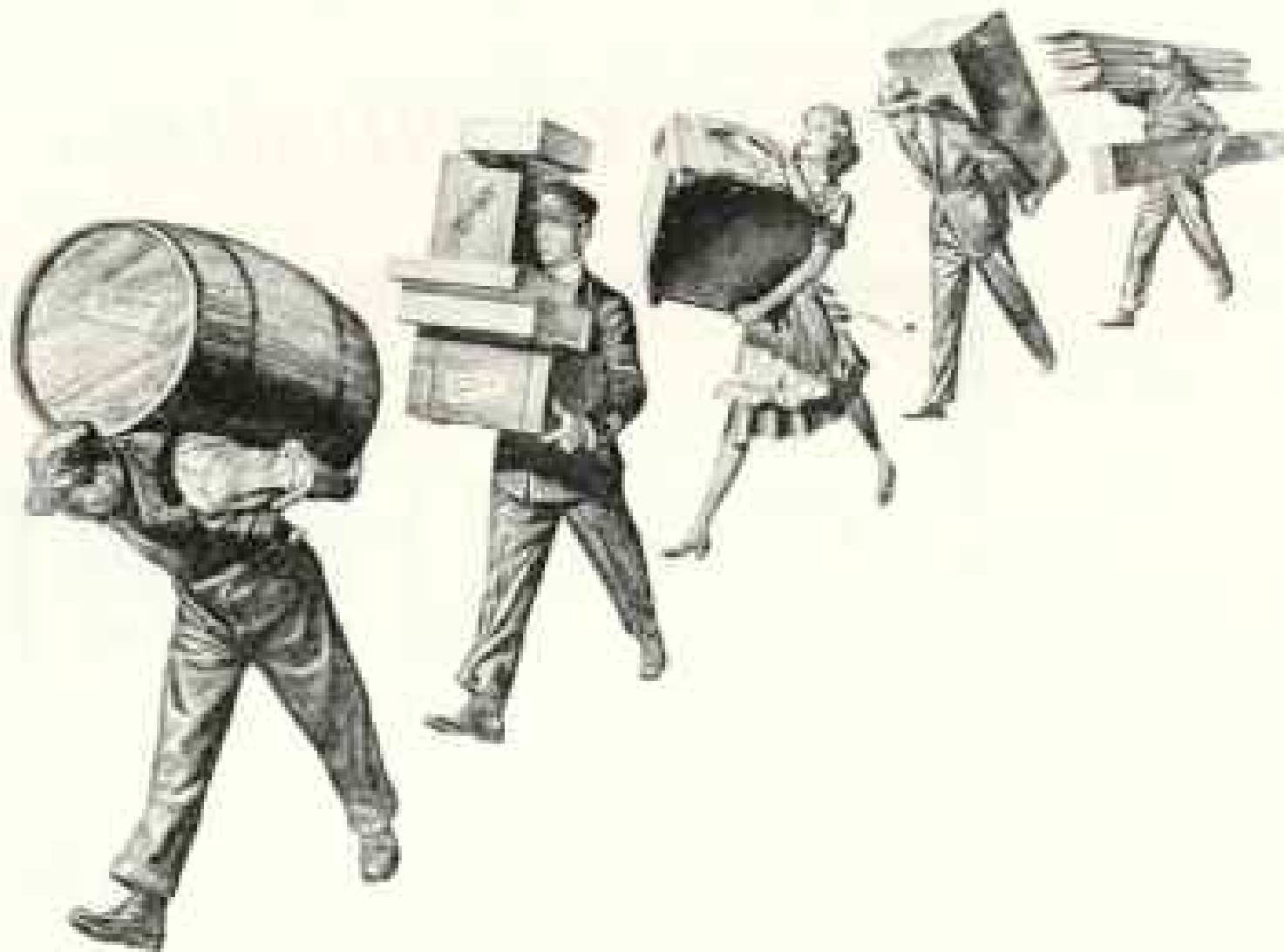
"This development, which makes possible the production on one record of complete symphony and musical-comedy scores, is expected to produce revolutionary changes in the industry."
Joseph Kaslow, New York Herald Tribune

"The savings they (LP Microgrooves) represent to the buyer and collector of records will be tremendous."
Paul Hume, Washington Post

"For fidelity and details of reproduction of musical performance the new record is superior to anything I've ever listened to."
Samuel T. Wilson, Columbus Dispatch



FREE DEMONSTRATION! Hear this amazing new record at your local dealer! Unlike many major new developments, the Columbia (LP) Long Playing Microgroove Record does not make your present phonograph, or your present record collection obsolete. You can adapt your present radio or phonograph to enjoy it. The Columbia Player Attachment will play LP records through your set... and it will quickly pay for itself through your savings on LP record purchases. Many new combinations with two-speed turntables are also on the market, designed to play both the LP and conventional records. Enjoy a thrilling demonstration today at your local Columbia Record Dealer.



Suppose America depended on this kind of "common carrier"



Let's suppose that railroads had *only* man power—no equipment whatever—and that their employees had to transport America's freight on their backs.

If each railroad employee could carry on his back 75 pounds of freight 15 miles a day, to move a ton of freight one mile would cost, at present wage rates, \$18.45. This means that *your individual* freight bill on the things *you consume* would amount to \$84,473.00 per year.

But actually, of course, the railroads provide each worker with \$20,265 worth of such "tools" as cars and engines and the tracks

on which they run. These tools so greatly multiply the transportation output of each worker that the average cost of moving a ton of freight one mile is only 1½¢.

So it's easy to see how important it is to everyone in America that the railroads have the best equipment available.

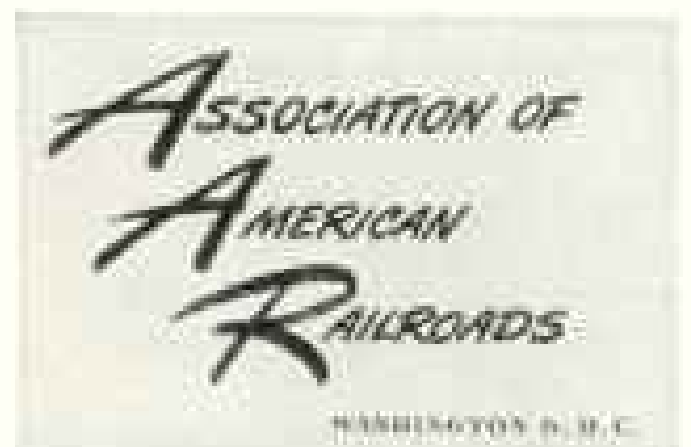
Right now, railroads are adding new locomotives...freight cars...passenger trains...signals...rail...all sorts of the latest improvements, just as fast as they can get them.

To keep on improving America's rail transportation system, the railroads must be allowed to earn enough to supply their workers with even more and better "tools." Only in this way can they con-

tinue to provide the low-cost, efficient transportation so essential to the very life and prosperity of our nation.

★

Listen to *THE RAILROAD HOUR* presenting the world's great musical comedies. Every Monday evening over the ABC network, 8-9:45 Eastern, Mountain, and Pacific Time; 7-7:45 Central Time.



"What's beneath their beauty
is more exciting still..."

said ANN DELAFIELD

when told the story of the
new DuraPower Mainspring
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"BEST-DRESSED
WOMAN"
Miss Delafield is the
director of the
DuBarry Success School



Styled by Hansler



THE
DuraPower
Mainspring®
ELIMINATES 99% OF ALL
REPAIRS DUE TO STEEL
MAINSRING FAILURES!

Superbly styled, the new Elgin Watches are exciting to see! Beautiful beyond compare. But there's an *inside* story that impressed Miss Delafield as "more exciting still".

For the first time in any watch—a mainspring that holds its original watch-running power. A mainspring that will never rust—and rust is the greatest cause of breakage. This miracle DuraPower Mainspring of Elgin's eliminates 99% of watch repairs due to steel mainspring failures. And you get it at no extra cost in every Elgin Watch this achievement of America's creative and productive genius.

Make sure of your loved one's *continued* happiness from your gift. Look for the DuraPower symbol "dp" on the dial and choose from the beautiful new Elgin Watches your jeweler is now displaying.

Lord and Lady Elgins are priced from \$67.50 to \$5000.00. Elgin De Luxe from \$47.50 to \$65.00. Other Elgins as low as \$29.75. All these prices include the Federal Excise Tax

*Made of "Elalloy" metal. Patent pending

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TIMED TO THE STARS!

The genius of America ★★ to wear on your wrist

Hear Elgin's "2 Hours of Stars" Thanksgiving Day, NBC Network

Look what you can have at
your elbow the year round . . .



You can have home-grown peaches, cherries, corn, and other fruits and vegetables that you enjoy so much all year round, when you freeze and store them in a General Electric Home Freezer.



You can stock a variety of commercially fresh-frozen foods, buy in quantity when you see bargain buys! You can stock cod filets, spinach, applesauce, grapes—even French fried potatoes!



You can have choice meat the year round. You can buy in quantity, have the meat cut into steaks, roasts, etc. You pay less for food, enjoy better living when you own a General Electric Home Freezer.

. . . when you own a dependable
General Electric Home Freezer!



This is the 8-cu-ft model that holds 280 pounds of frozen food. Also available in 4-cu-ft. Note convenient baskets.

When you go to buy a Home Freezer, be sure you're getting the best dollar-for-dollar buy.

A freezer is a long-term investment, and you've every right to expect dependable service year after year.

General Electric Home Freezers have the same type of sealed-in refrigerating system as that used in G-E Refrigerators. More than 1,700,000 of these dependable General Electric refrigerating systems have been in service in G-E Refrigerators for 10 years or longer.


See the G-E Home Freezer at your General Electric retailer's, or write for interesting booklets to General Electric Company, Bridgeport 2, Connecticut.

General Electric Home Freezers

For quick-freezing foods at home . . .

For storing the frozen foods you buy

GENERAL  **ELECTRIC**



The high cost of living

is shooting us all sky high!

When living costs rise like a rocket, that's every bit as bad for business as it is for customers. Fewer people buy when prices are too high.


In our own business we do everything we can to keep prices *down* and quality *up*. Once each month key men from all our companies sit down to plan new ways to increase efficiency and improve products—so you will get *top quality at lowest possible price*.

Here are some figures which show how milk prices compare with food prices, from 1939 to 1948:

Increase in cost of food . . . 116%
Increase in cost of fluid milk . 78%

Notice that milk has not increased nearly so much as the average of other foods. Our profit from all of our milk divisions averaged less than $\frac{1}{2}$ cent per quart sold in 1947—far less than the public thinks business makes—and much less than the average profit in the food industry.

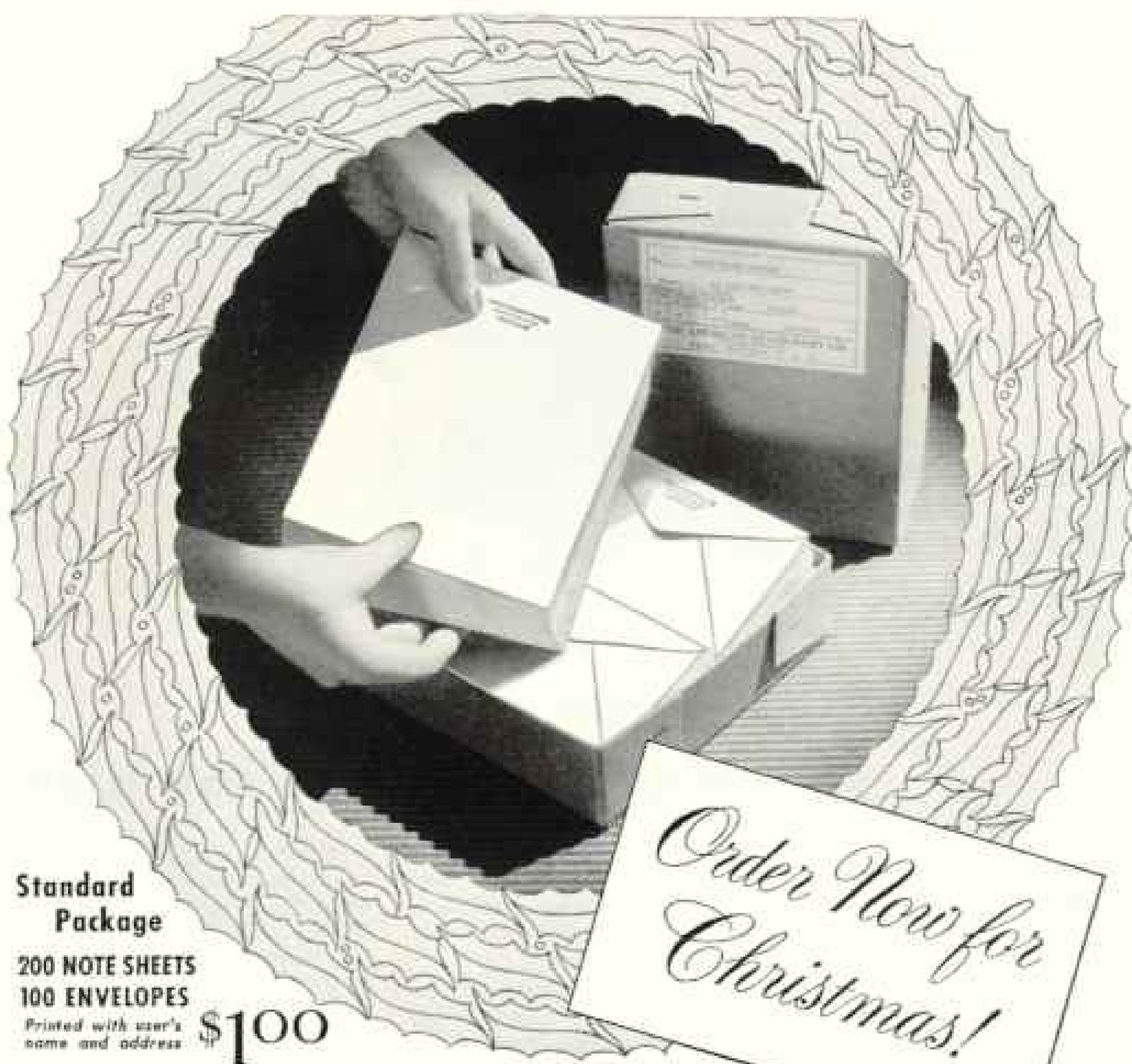
Milk—nature's most nearly perfect food—helps your budget by giving you more for your money than anything else you can eat. We guard the quality, flavor and nutritional values of milk, and cheese, butter, ice cream and other products made from milk. *Then we make them available to the largest number of people at the lowest possible prices.*



An impartial national survey shows that most Americans consider 10%-15% on sales a fair profit for business. Compared to this, the average profit for the food industry is less than 5%. And National Dairy's profit in its milk divisions in 1947 was less than 2%.

NATIONAL DAIRY
PRODUCTS CORPORATION





Standard Package

**200 NOTE SHEETS
100 ENVELOPES**

Printed with user's name and address

\$100

Order Now for Christmas!

This stationery has been used for informal correspondence in America's fine homes for 32 years. Its crisp, white *rug content* bond paper is printed with the user's name and address in rich, blue ink. It's a perfect gift—tasteful, personal, useful.

List each name and address as you want it printed (maximum printing—4 lines, 30 characters per line). The stationery will be mailed to you. Please order in quantities as listed. No "split" order accepted. Remit with order. West of Denver, Colo., and in U. S. possessions add 10% to prices. We pay postage. Satisfaction guaranteed.

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AMERICAN STATIONERY

The Fine Stationery in the Plain Box

Envelopes Only

For those who need lots of envelopes for paying by check, etc. 200 envelopes only (as in Standard Package). Printed.

\$100

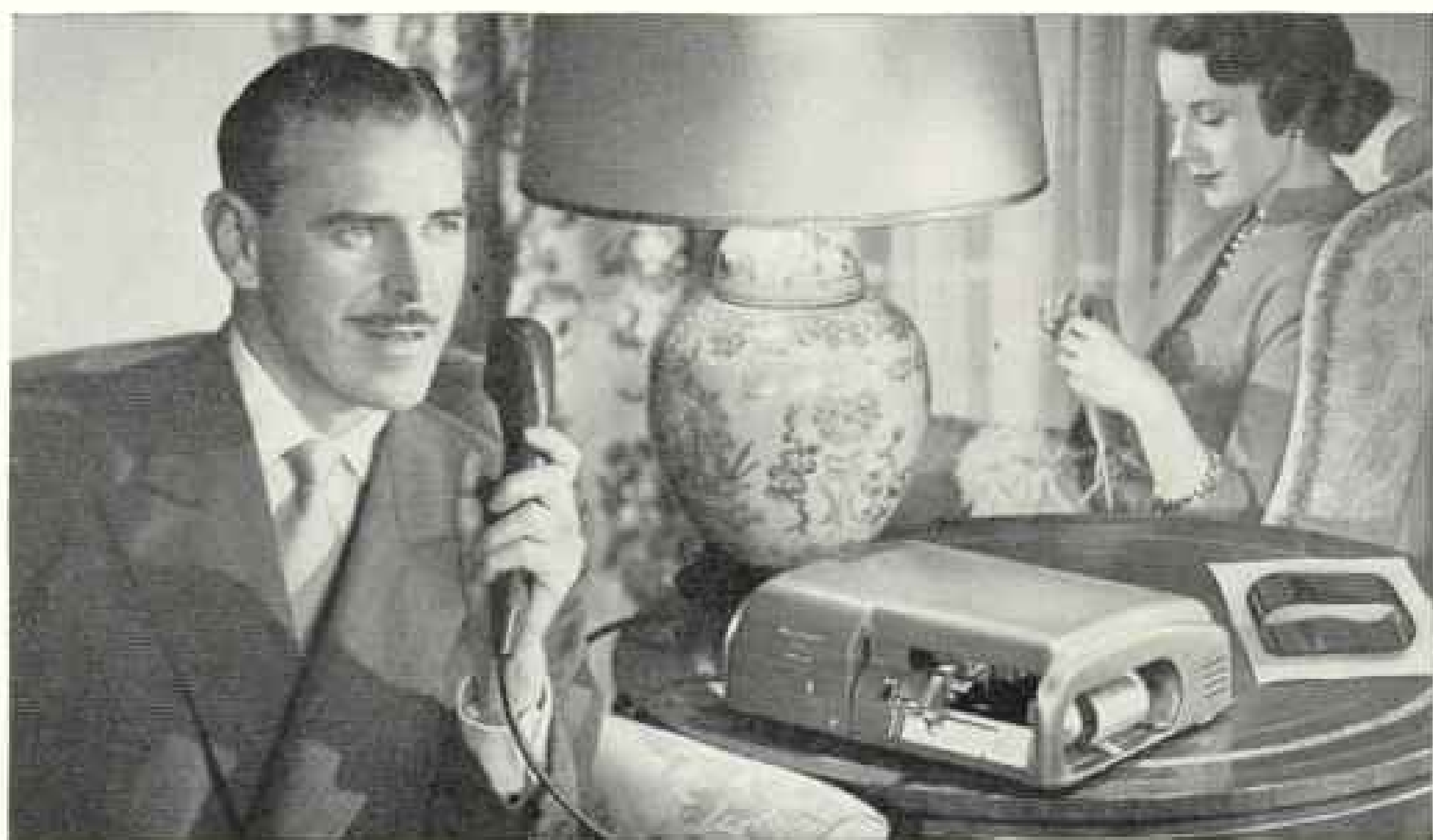


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For those who prefer *long style* sheets and envelopes, in *heavier* paper. 125 sheets (6 3/4 x 10 1/4) and 125 envelopes to match. Printed.

\$200





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Amazing New Dictaphone TIME-MASTER records on plastic belt!

The electronic TIME-MASTER is the neatest, most compact dictating machine that ever took a letter or trapped a thought!

And you can mail that voice letter as easily as you can any business correspondence. For the TIME-MASTER records on a small plastic Memobelt—just the right size for your business envelope!



Twelve plastic belts—or three hours of dictation—will fit into your billfold. Hand them to your secretary for the easiest transcriptions she ever made.

Dictaphone

Electronic Dictation

Only Dictaphone Corporation makes Dictaphone® Machines.
(*Reg. U. S. Pat. Off.)

Yes, this new dictating development means greater convenience in every way for you and your secretary. Nothing can match the TIME-MASTER for *all* dictation—in your office or home and on trips. Its recording is *outstandingly* clear and transcribable.

That's because the famous Dictaphone principle of *cylindrical* recording still applies. The Memobelt is the *only* plastic dictating medium that assures *both* uniform tonal clarity and quality from beginning to end.

No other dictating machine has *all* these advantages: Lightweight, all-metal construction, easily mailable and fileable plastic belt recordings, voice-perfect recording, constant groove speed, uniform backspacing, rapid place-finding! Every facility for easier dictating and transcribing—*plus* famed Dictaphone dependability!

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 Please send TIME-MASTER literature.

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City & Zone _____ State _____

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The World's Most Personal Fountain Pen

No other pen makes so personal a gift as an Esterbrook . . . with the right point for the way they write. Send an Esterbrook to every person on your list. Give yourself one, too.

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*To select or replace
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Here's a merry Christmas with the right pencil for the way you write—

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MATCHED PEN AND PENCIL SETS
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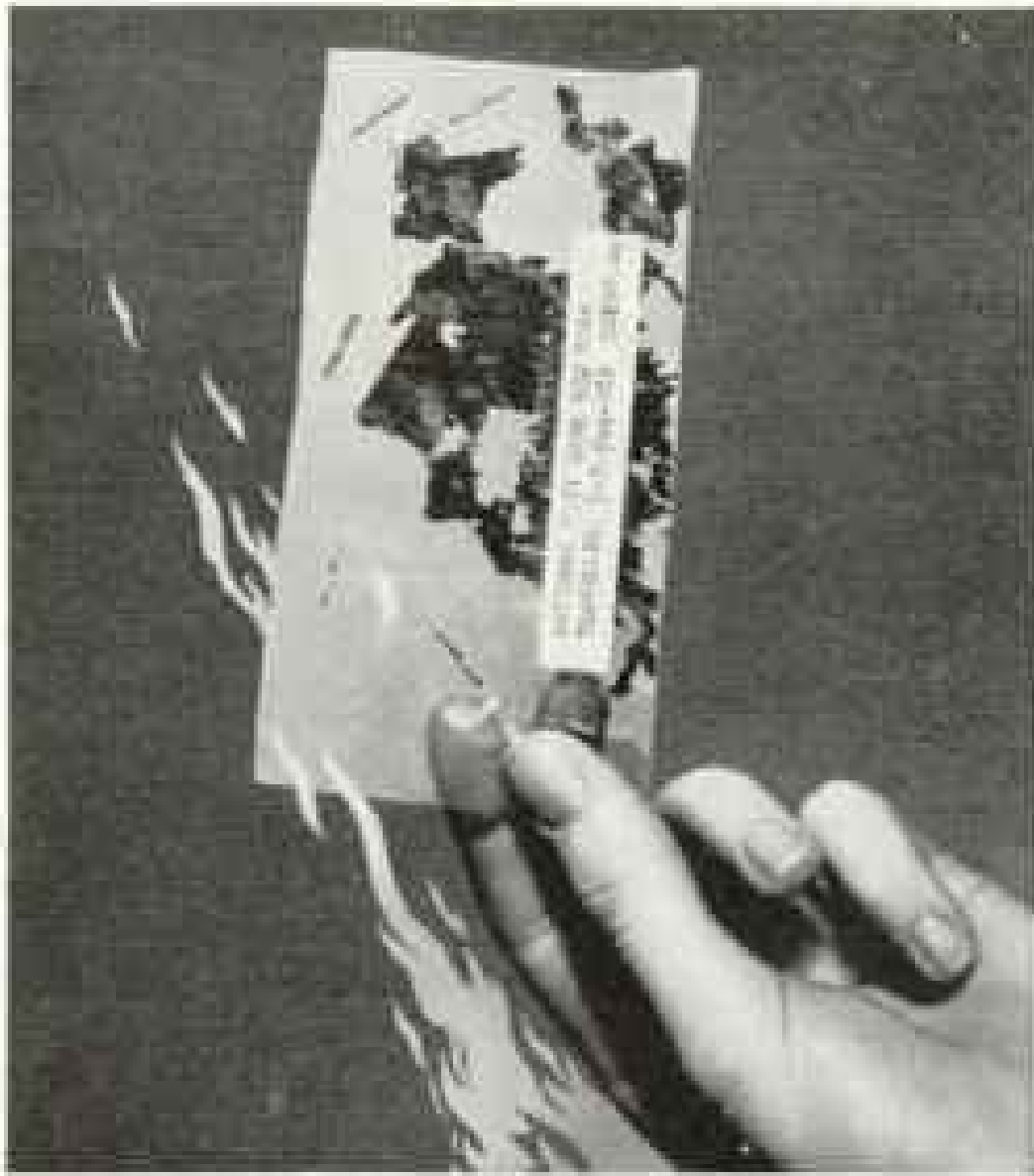
\$499⁹⁵
WALNUT

Plus installation and Fed. tax.
Mahogany or blonde cabinet kits.
Prices slightly higher in south.



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WHAT DO YOU KNOW ABOUT FLORIDA?

Here is a little quiz about Florida. Just for fun, see how many you can answer correctly. Count 10 for each correct one. A score of 80 indicates you know your Florida, but 60 or 70 is excellent. You'll find the answers at the bottom of this page.



1. **SWIMMING** Florida's climate permits "summer" sports and recreation all year round. What is the annual average temperature for the State?

- a. 70.9 b. 59.6 c. 65.0 d. 78.2



5. **HOME** If you live in your own home in Florida, how much of its valuation is exempt from municipal and county taxes, except for special benefits?

- a. \$5,000 b. \$1,000 c. \$2,500 d. \$500



2. **FISHING** How many varieties of fish are found in Florida's rivers, lakes, coastal and offshore waters?

- a. 600 b. 100 c. 200 d. 400



6. **VEGETABLES** How many freight cars were needed last season to handle Florida's winter production of fruits and vegetables?

- a. 15,347 b. 24,602 c. 67,981 d. 111,736



3. **INDIANS** What tribe of Indians, famous for its unique and colorful costumes, lives in Florida?

- a. Cherokee c. Seminole
b. Iroquois d. Shawnee



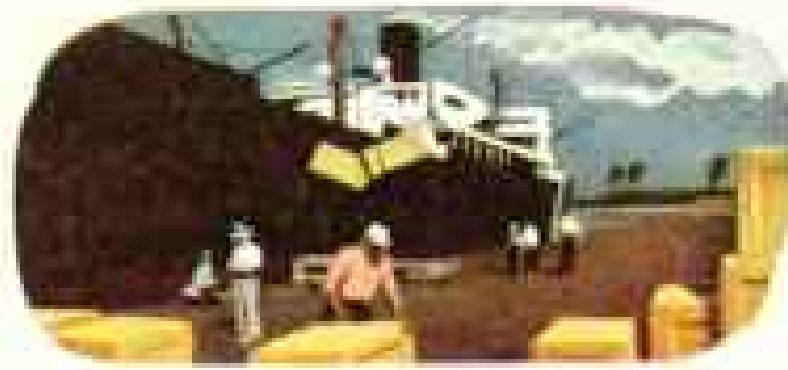
7. **HIGHWAY** Most Florida vacations include sightseeing trips. How many miles of paved highways are provided so you can comfortably see ALL of Florida?

- a. 3,000 b. 5,500 c. 9,000 d. 7,200



4. **BEACH** With the Atlantic on one side and the Gulf of Mexico on the other, Florida has the longest salt water coast line of any state. How long is it?

- a. 700 miles c. 900 miles
b. 1,400 miles d. 1,200 miles



8. **INDUSTRY** Florida's income from citrus during the 1946-47 season was approximately \$147 million. What was its 1947 income from manufacturing?

- a. \$100 million c. \$520 million
b. \$270 million d. \$700 million

Of course, the best way to really know Florida is to come down for a vacation this winter. Get the feel of Florida sunshine. Stretch out on the warm sands. Rest! Relax! Catch a sailfish or a big bass...Swim in the bluest water you ever saw. Play golf. Enjoy thrilling spectator events. Dance under a tropical moon. Visit famous gardens, springs, unusual attractions and historic landmarks. See ALL of Florida!

You can make your Florida holiday as de-luxe or as economical as you like. Florida offers its recreation and accommodations in all price ranges.

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ANSWERS: 1. a 2. a 3. c 4. b 5. a 6. d 7. c 8. d

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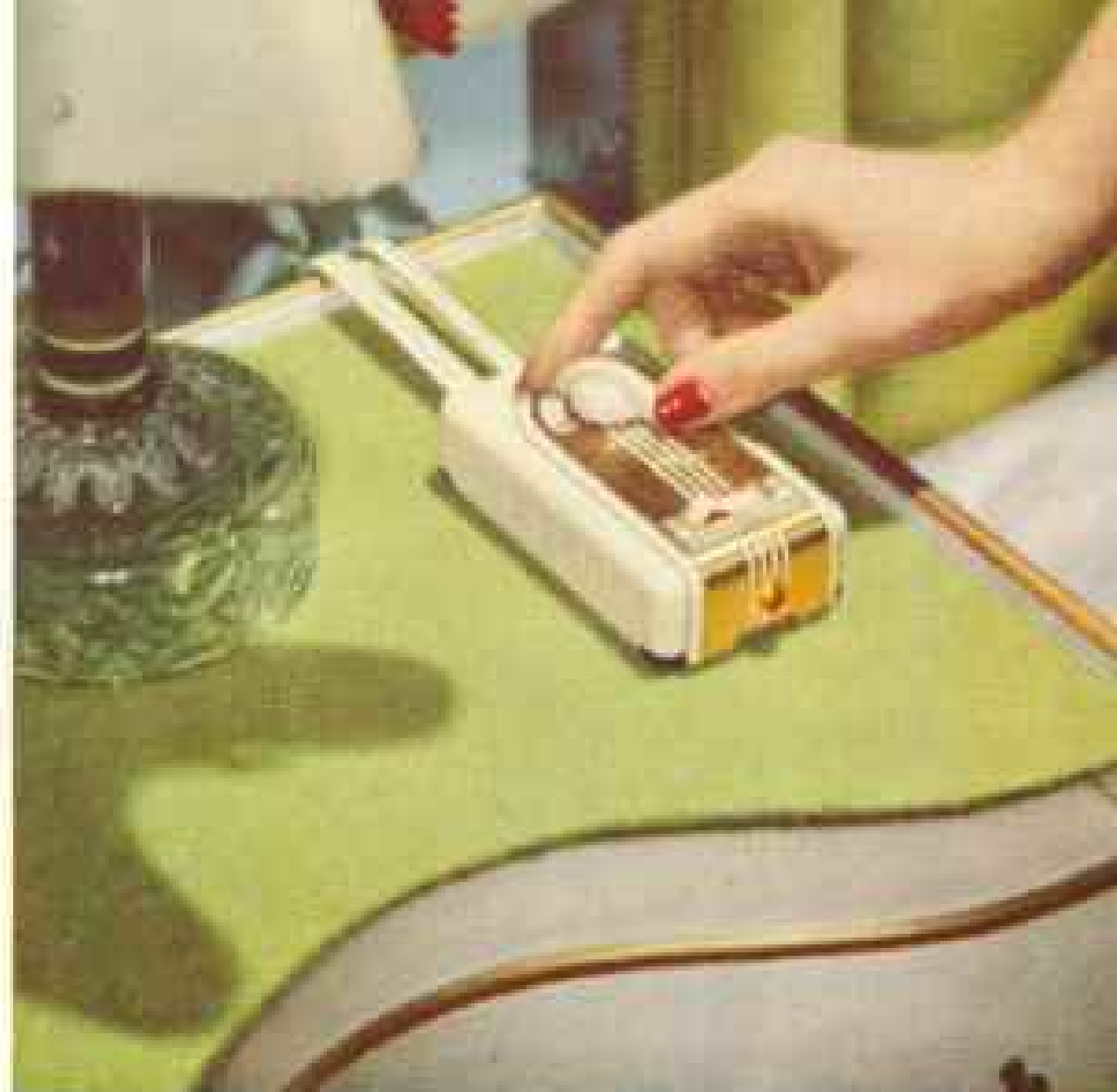


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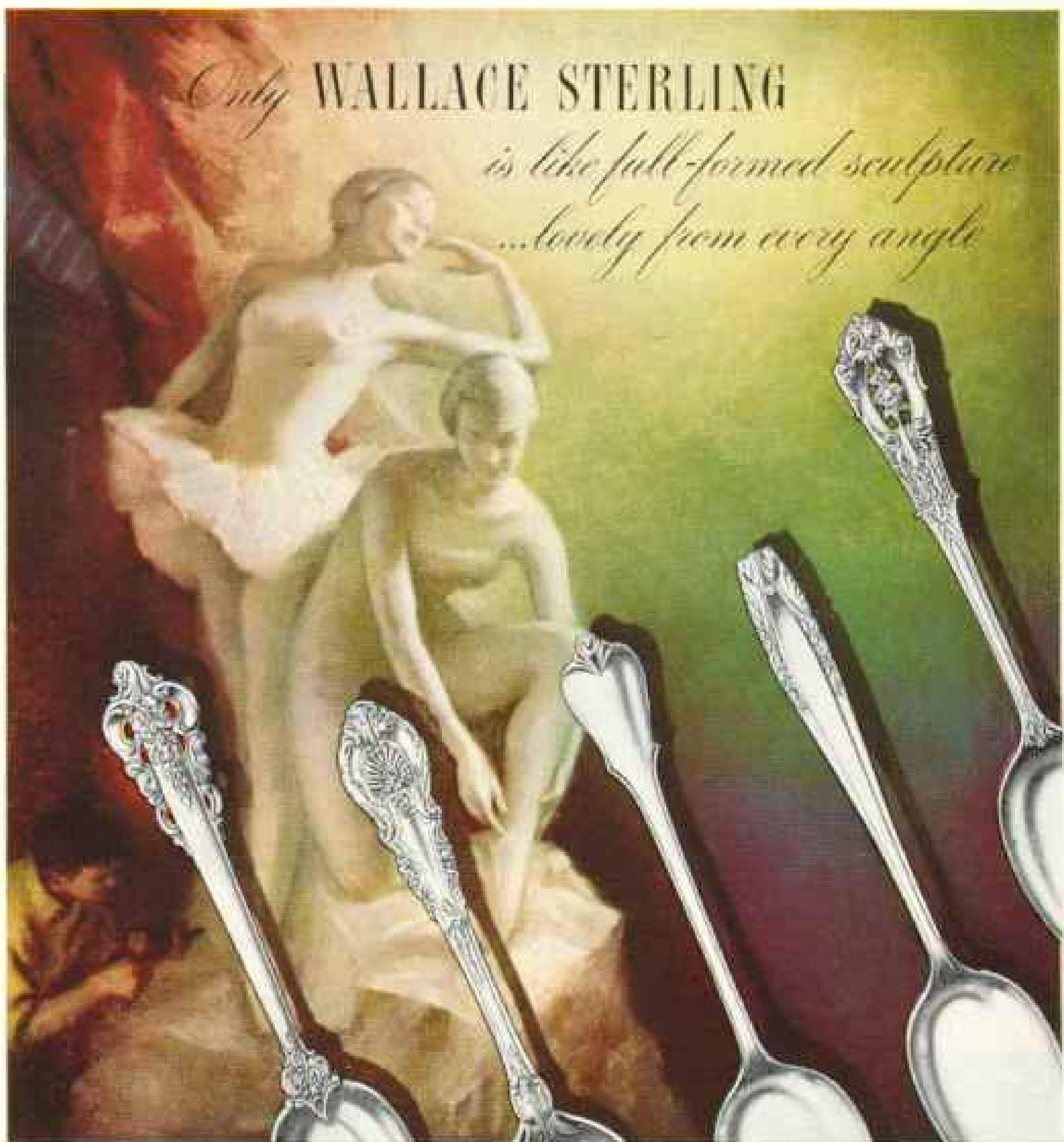
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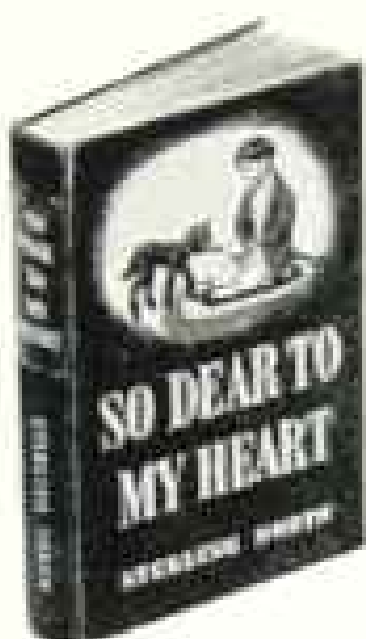


THANK YOU for letting us take your picture



Today we sent a new kind of live-action motion picture over to Technicolor for prints.

It's about you. So we think you ought to know a little about it in advance just in case you *didn't* read the story in Sterling North's



Don't miss the condensation of this beloved novel in the December "Reader's Digest."

beloved book "So Dear To My Heart."

Think back for a moment . . .

★ ★ ★ ★

You can't help but smile when you recall experiences you had while growing up.

The mischief you did. Your hilarious blunders. Your great discoveries

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Somehow their adventures around Fulton Corners reflect the most treasured chapters

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★ ★ ★ ★

We think, too, that you'll love this picture's music . . . tunes that folks are saying have the lilt and color of new American folk songs.

And woven into the live-action story



Such singable songs that will dance right into your heart.

are new cartoon characters designed to win a sizable corner of your heart.

But it's the *story* itself that will make you say, "It is a picture of me!"

So thank you for letting us take your picture in "So Dear To My Heart." We believe you'll find it a good likeness.



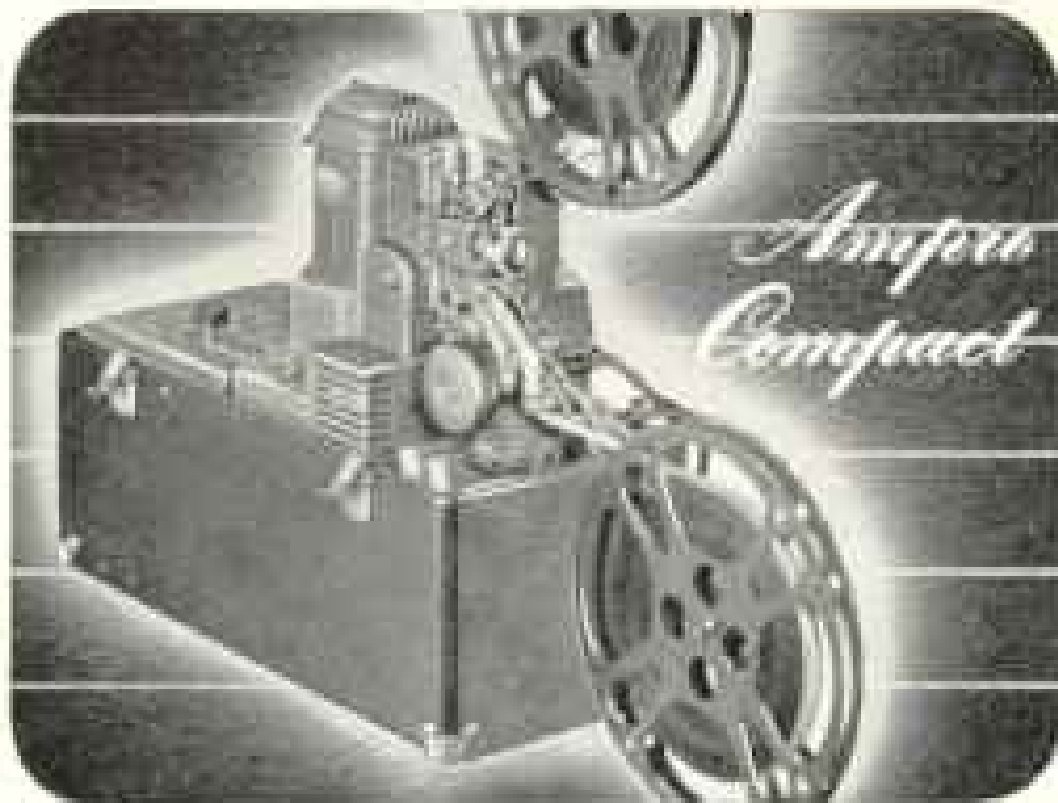
Remember your first "important personal business" with a great big kindly man named God?

Walt Disney

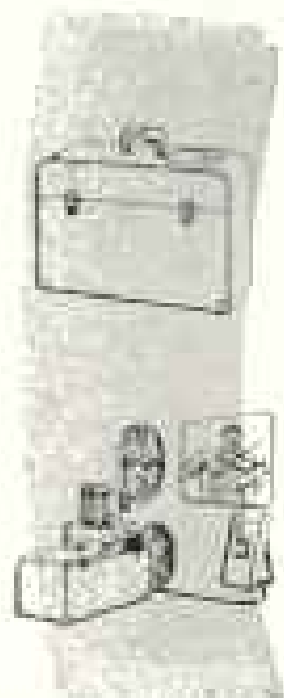
"So Dear To My Heart" is a live-action musical play starring BURL IVES, BEULAH BONDI, HARRY CAREY, BOBBY DRISCOLL, LUANA PATTEN; directed by Harold Schuster; released through RKO Radio Pictures. COLOR BY TECHNICOLOR.

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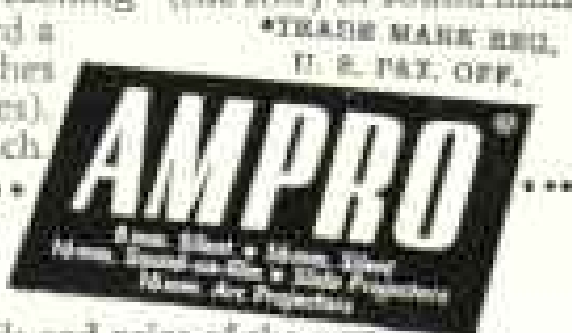
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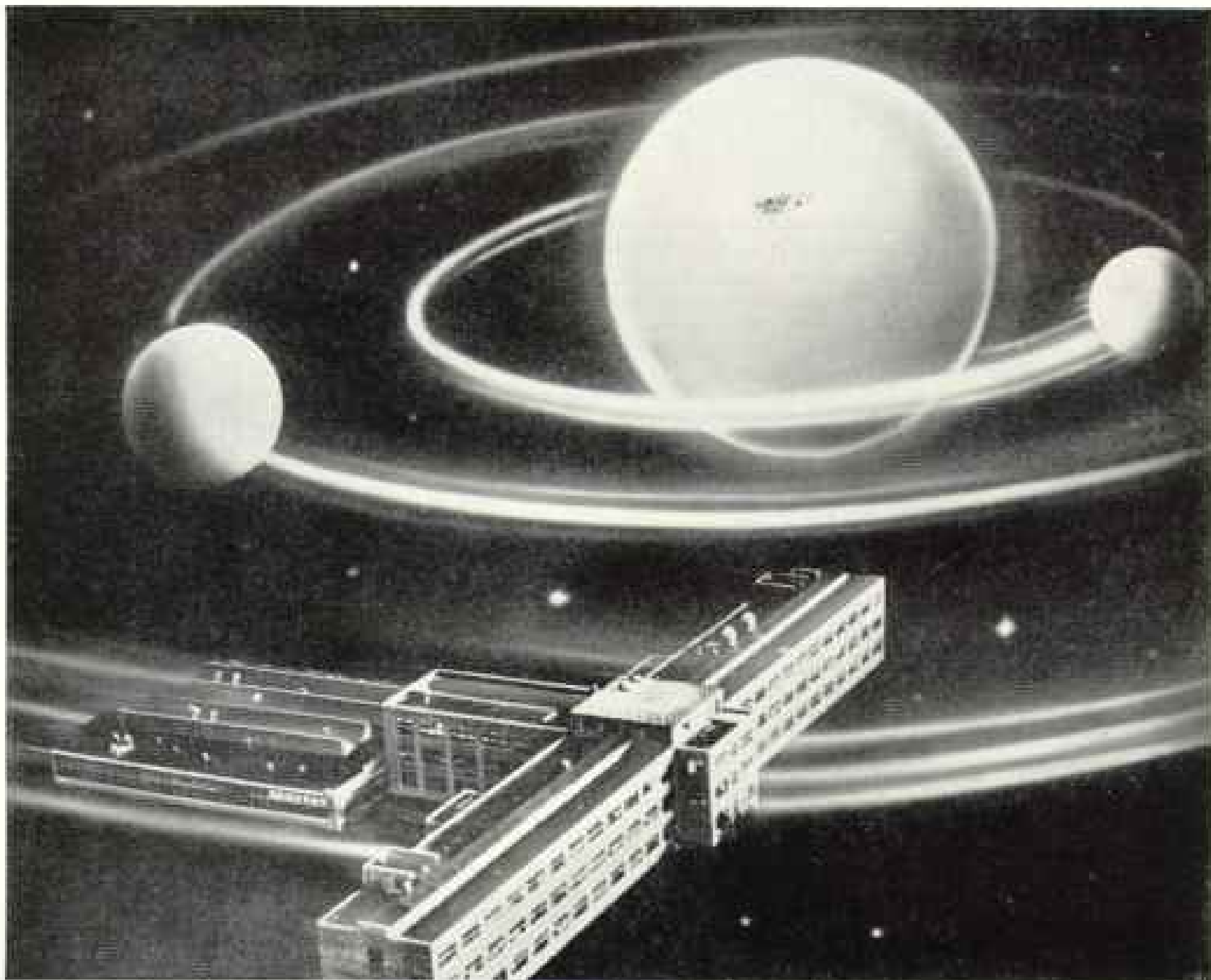
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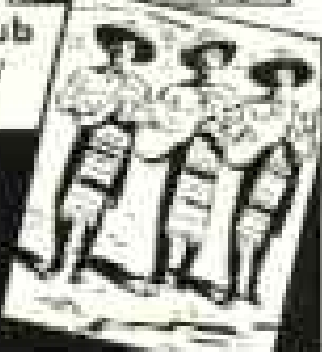
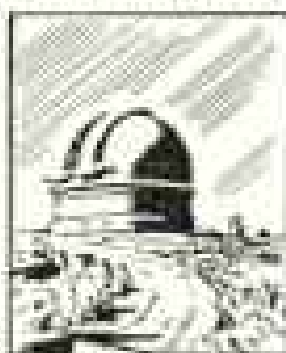
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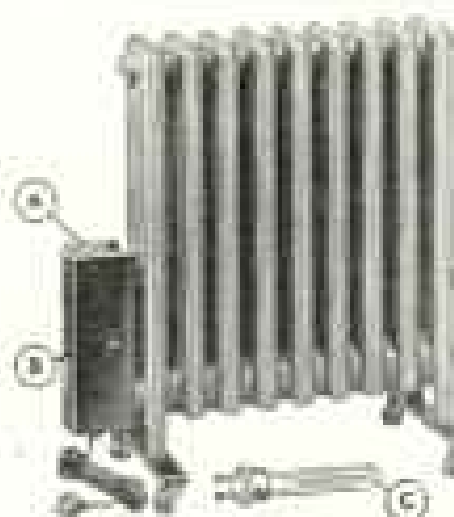
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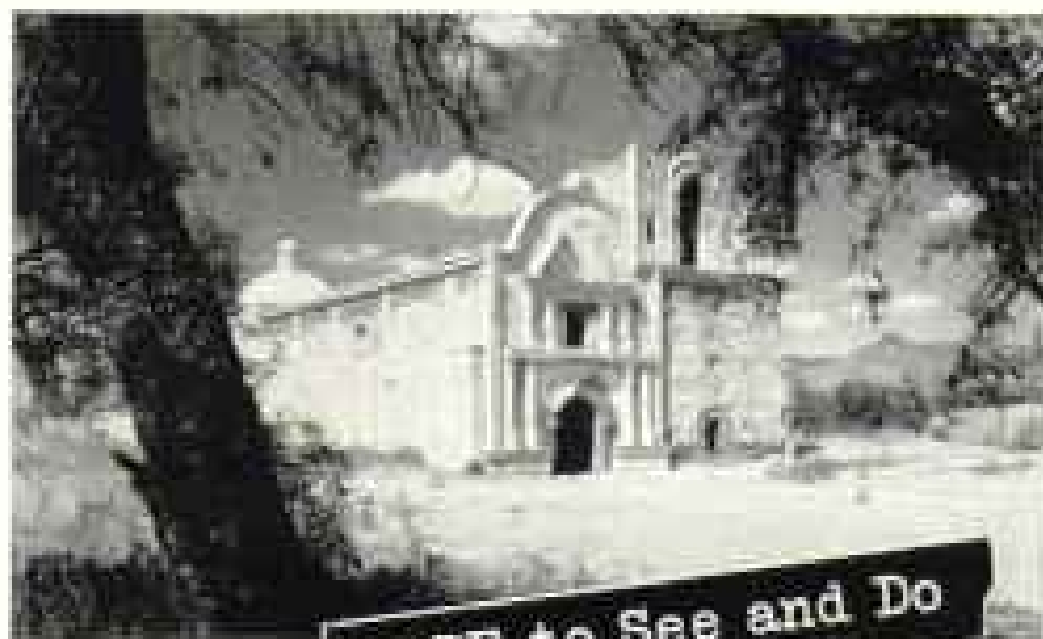
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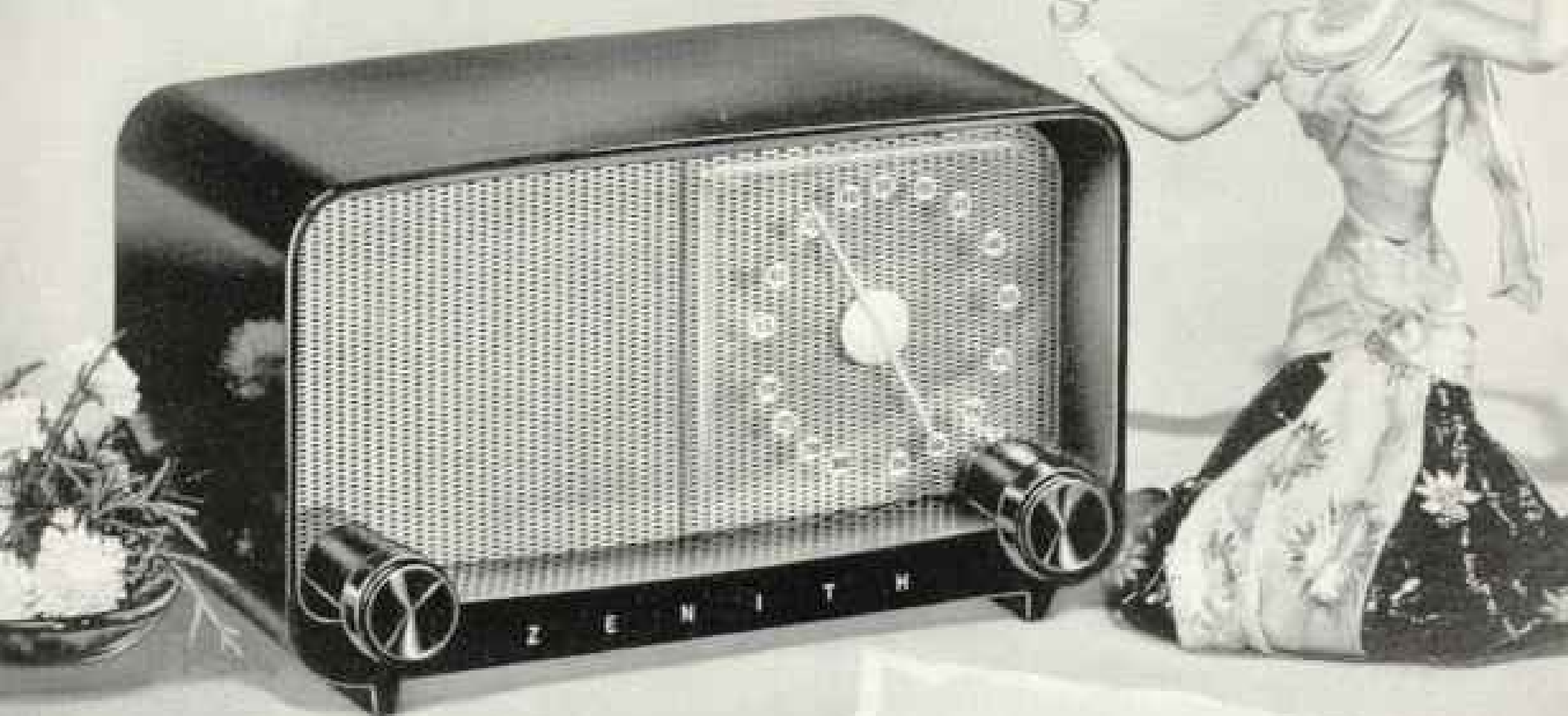
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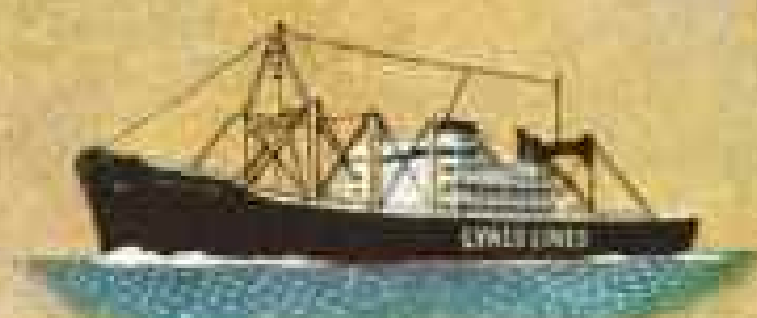
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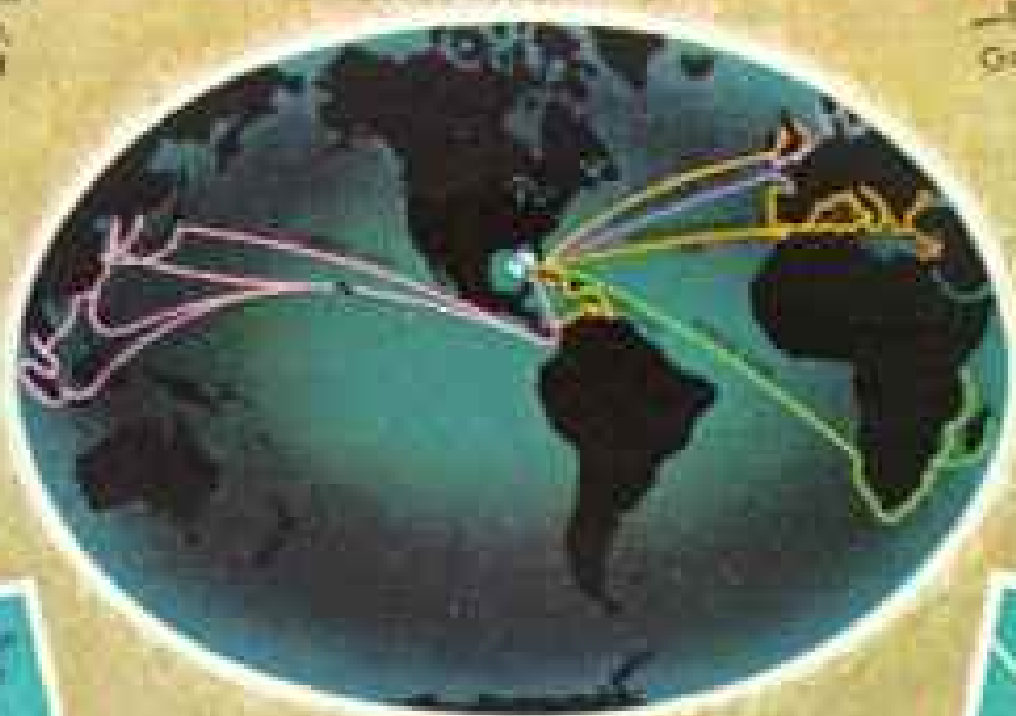
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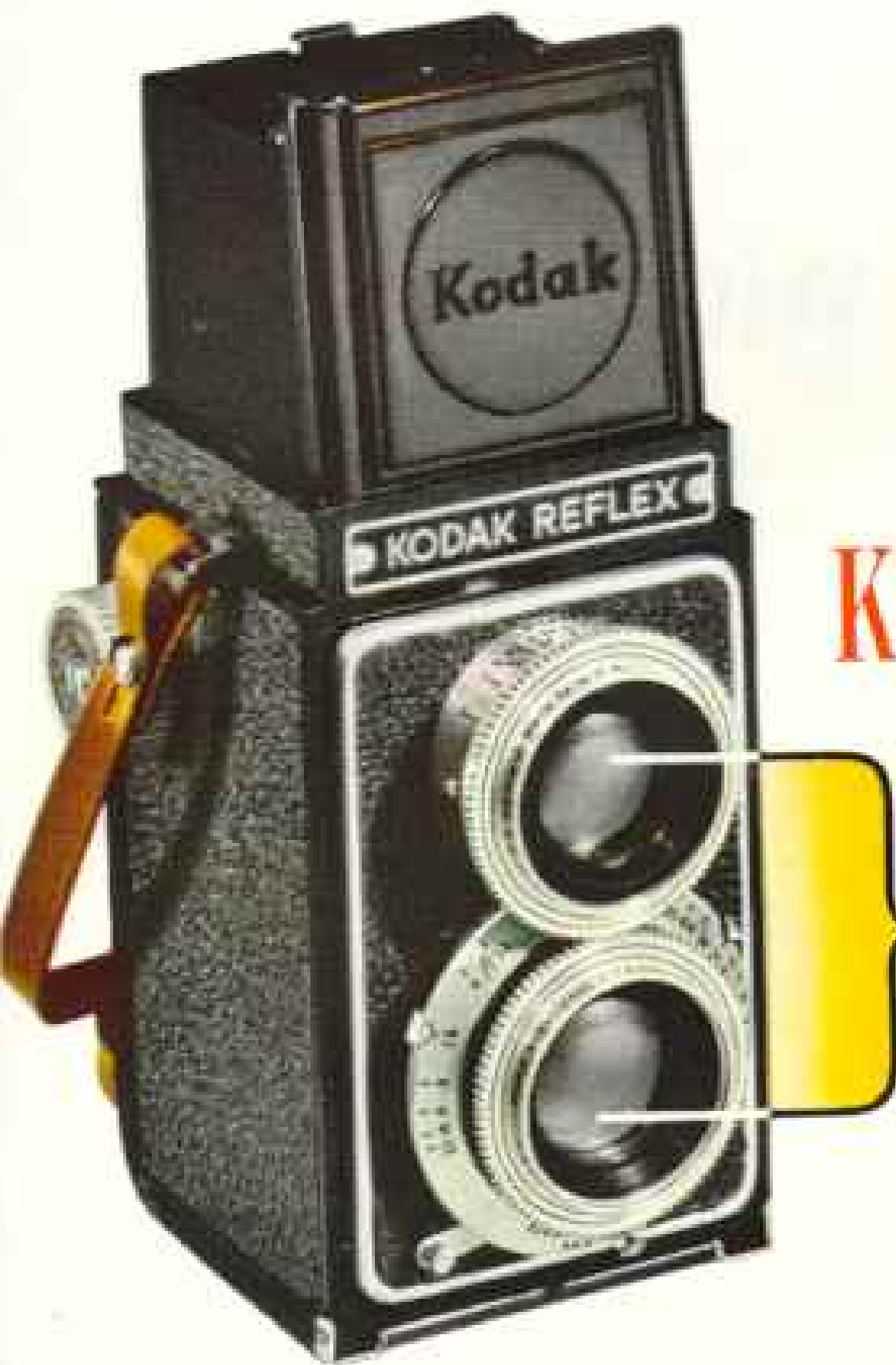
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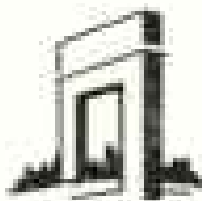
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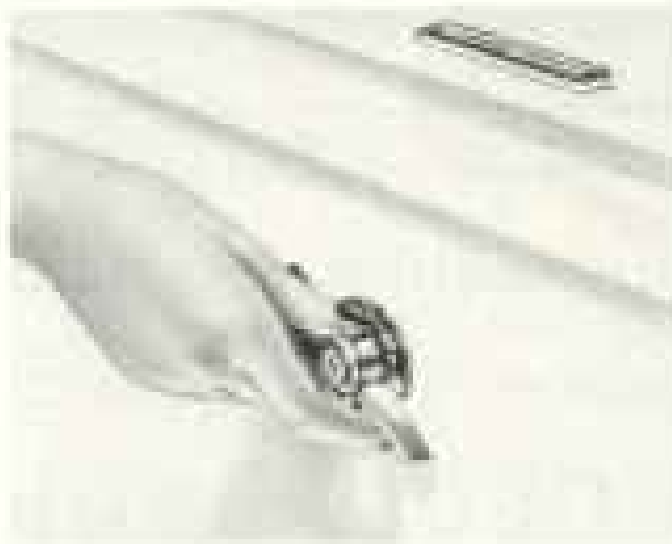
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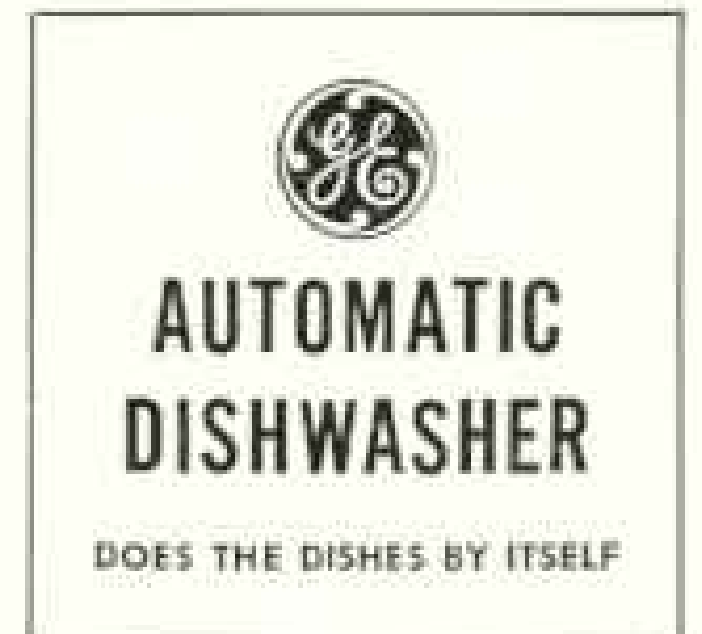
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