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NEW JERSEY NOW!

By E. John Long

Author of "Oxford, Mother of Anglo-Saxon Learning," and "Montserrat, Spain's Mountain Shrine," in the National Geographic Magazine

SUPPOSE, a few years ago, a dictator had called his engineers and architects together and said:

"Build me a city on a sand bar seven miles at sea, remote from other cities. On my sand bar man can raise no food; there is no fresh water, nor any stone, steel, cement, or lumber. But here I want wide boulevards, skyscraper hotels, thousands of homes and shops, with food and drink for 60,000 residents. I want the beaches around this city to be clean and healthful, so find a way to dispose of waste.

"Further, I want you to construct this city so flexibly that I may move in my army of 400,000 overnight, and be able to shelter, feed, and amuse them all over week-ends. Then your trains and buses must whisk them away between sunset and dawn. Such invasions will occur several times a year."

What would the engineers and architects have said? That such a miracle transcended human power!

Yet Atlantic City to-day is that miracle.

All the great treks of history—the Persians under Xerxes, the Huns under Attila, the Moslems under Mohammed II, the "Golden Horde" of Tatars, the Norman invasion, and the Crusades—shrink to thin ranks when measured against Atlantic City's 12,000,000 annual visitors. All the population of a nation like Argentina or Canada, or almost twice the population of the Australian Continent, pilgrimaging in a few months to a strip of sand ten miles long and a half to three-quarters of a mile wide!

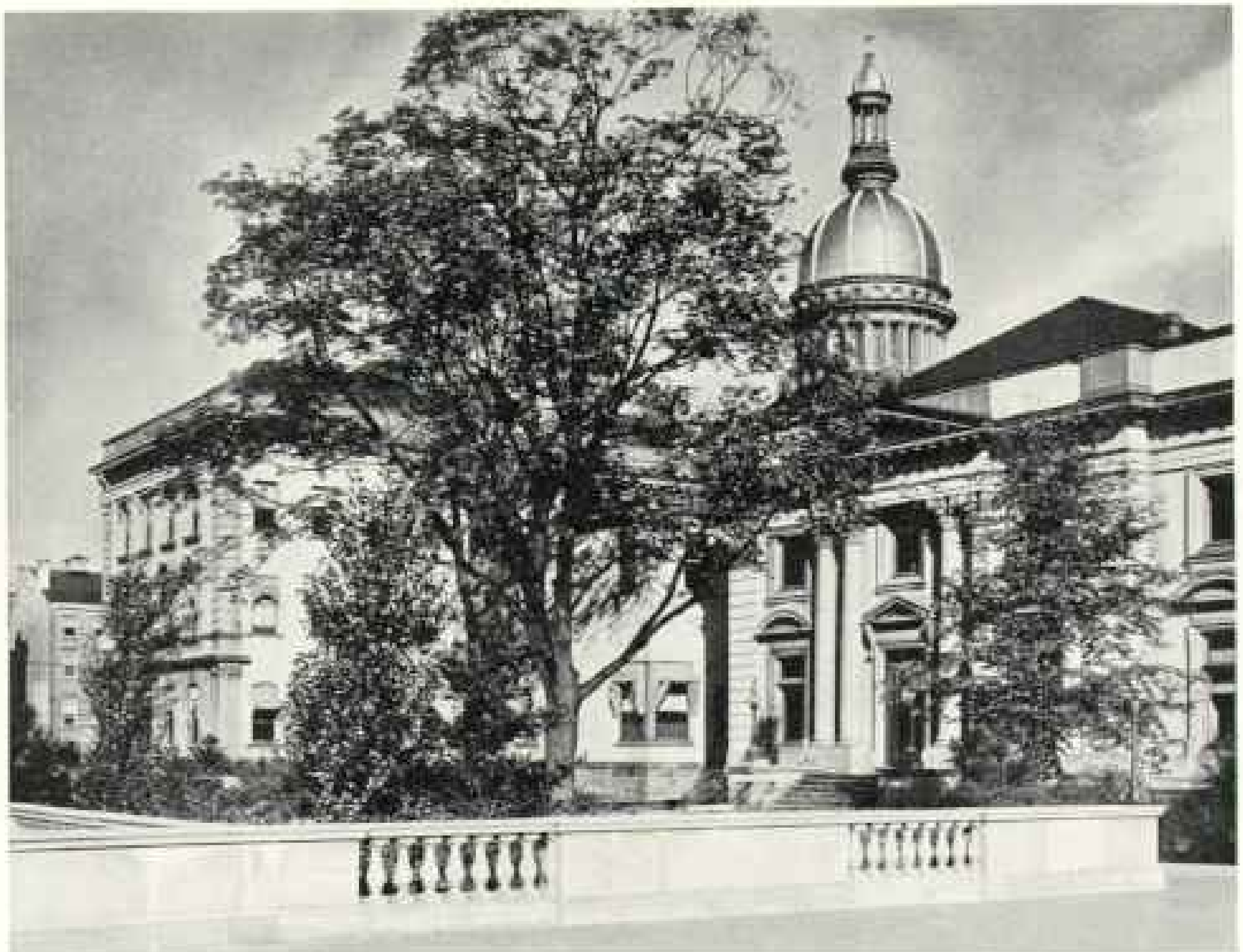
Less than one hundred years ago Atlantic City was a nameless cluster of fishermen's huts on Absecon Island. Then came rails from Philadelphia, and the first excursion train, July 1, 1854. Its 500 passengers taxed the pioneer resort. But what would its early innkeepers say now if they could see Atlantic City receiving 500 visitors every minute during 12 hours of a July Fourth or Labor Day week-end!

WHERE PEDESTRIAN IS KING

The famed Boardwalk begins at the Inlet and parallels the ocean shore for seven miles through Atlantic City, and the adjoining municipalities of Ventnor and Margate City. Not all of Atlantic City's 12,000,000 annual visitors swim, sail, fish, or take part in the other amusements the resort affords, but all of them *walk*, or ride in a rolling chair, along this incomparable Boardwalk.

Morning, noon, and night the tap, tap, tapping of thousands of heels and toes resounds on planks where the pedestrian is king and where walking is no lost art. Rich man, poor man, artist, lawyer, merchant, actress, the Colonel's lady, and Judy O'Grady pass in review, to see and to be seen (see illustration, page 522).

No one knows just when this greatest of promenades began. Loose boards were laid on the sand around Civil War time. Tiny shops and bathhouses bordered the landward side. The planks were taken up at the end of the season and stored a safe distance from the reach of winter waves.



Photograph by Edwin L. Wisherd

THE CAPITOL WITH THE GOLDEN DOME, AT TRENTON

The Statehouse is difficult to photograph because it is hemmed in on three sides by other buildings. The fourth side overlooks the Delaware (see text, page 558). Adjoining the Capitol is the handsome new annex, containing several State departments and the State Museum of New Jersey (see illustration, page 570).

To-day's Boardwalk is a giant highway, as wide as a boulevard, carried on high concrete pillars and steel beams. Sixty miles north it is almost equaled in the Asbury Park boardwalk, and many other New Jersey resorts imitate it.

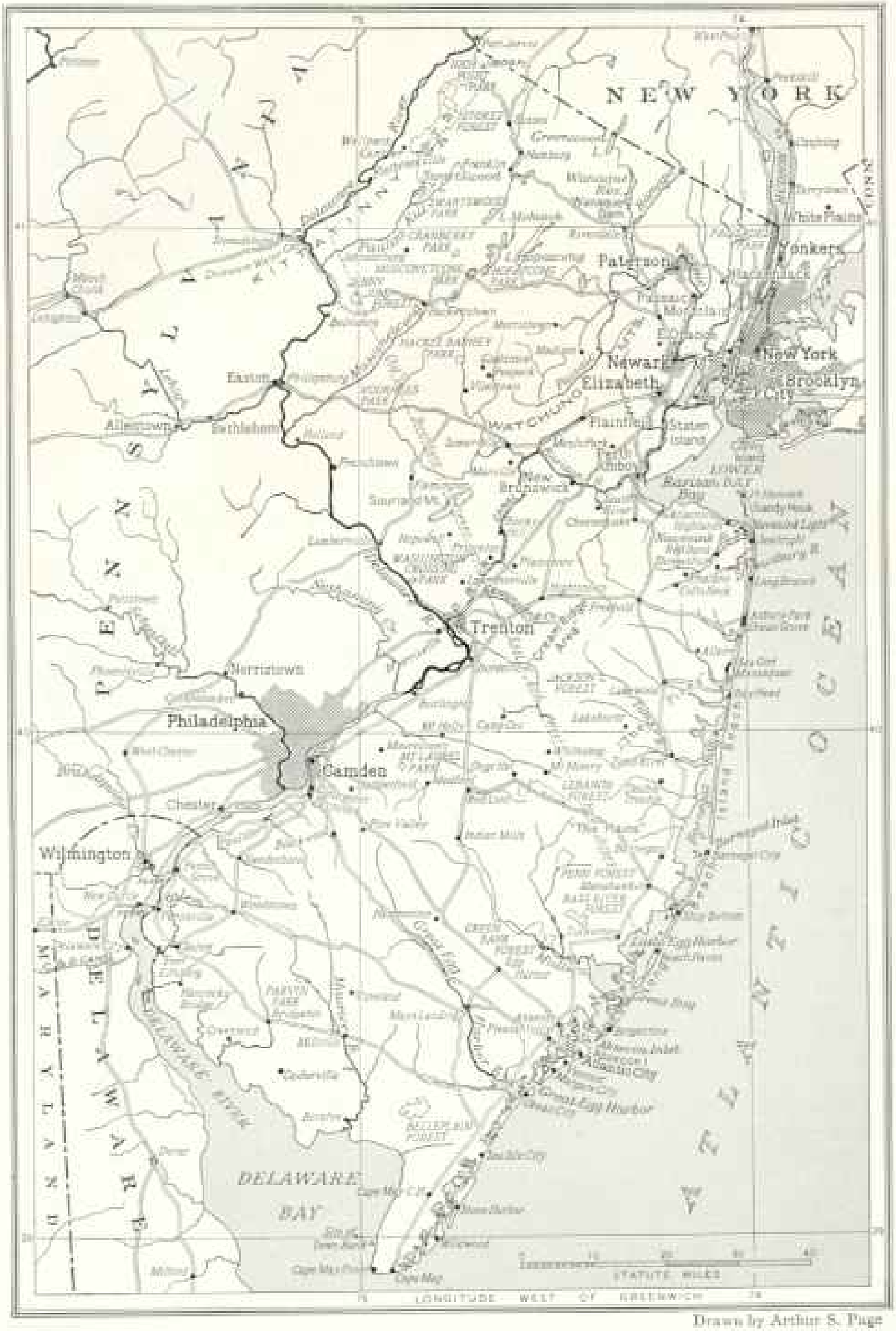
What a paradox this Boardwalk presents! Often it is one of the busiest thoroughfares in the world. Yet in that very bustle is leisure.

Something reminiscent of the country fair is here. On a pier a dozen haggard couples dance a marathon, shuffling around a waxed floor for more than 2,000 hours. Convention delegates crowd a mammoth auditorium. A flagpole sitter braves the sun and wind and storms night and day for weeks. Salt-water-taffy machines flick out morsels before your eyes. A Boardwalk photographer will take a "celebrity picture" of you. As you stroll toward him he steps up and snaps you.

Next to the visitor, Atlantic City's biggest "industry" is the making and shipping of "salt-water taffy." Legend says that in the early eighties a man had a candy stand on the beach. One day an unusually high tide splashed over a batch of old-fashioned, pulled taffy on a slab. Being an enterprising person, he told his customers that he had something new—"salt-water taffy."

The name struck a popular note, and to-day batteries of salt-water-taffy machines make more than two million pounds each year. About a third of this volume of sweetness (it is no longer flavored with salt water) is mailed out of Atlantic City to every State in the Union, and to such distant places as China, Japan, India, Egypt, Brazil, and the countries of Europe.

Much of Atlantic City's popularity as a bathing resort is due to the vigilance of a corps of life guards, known as "the



Drawn by Arthur S. Page

NEW JERSEY IS A TRAFFIC CENTER OF THE EAST

Although it is one of our smaller States, ranking 45th in area, it is ninth in population, and is crossed annually by millions on their way to New York or to the State's own mammoth beach resorts. Main motor highways are indicated on this map.

Photograph by Clifton Adams

THE PAGEANTRY OF ATLANTIC CITY IN A SINGLE PICTURE

Hotels, theaters, Boardwalk, rolling chairs, holiday-makers, honeymooners, sand sculptors, bathers, beach umbrellas, ocean piers, and the surf—few photographs have captured so much of the spirit of the resort as this.

Photograph by Acme

THE "SANTA PAULA" JOINS A TROPICAL FLEET

Four giant steamers in different stages of construction are shown at this busy shipyard at Kearny, near Newark. In the water (at top) is one vessel nearly completed; another slides down the ways, a third (center) is almost ready to be launched, and a fourth is hardly out of the keel-laying stage.

© Newark Evening News

THE FLEETEST CRAFT UNDER SAIL

Ice boats of the Long Branch Boat and Yacht Club jockey for positions at the start of a race.

Atlantic City Beach Patrol." So well did these wardens of the surf perform their duties last year that not one fatality resulted on the protected beaches of Absecon Island—a record that fittingly celebrated the fiftieth anniversary of the Life Guards Association.

The efficiency of the beach patrol was dramatically shown one bright Sunday morning in midsummer while I was standing beside a life-guard "pulpit" on the crowded beach. From far out beyond the line where the wave crests crashed into foam came a cry of distress. The two guards sprang from their lookout, launched their boat, and rowed in powerful strokes to where a drowning man was clutching and dragging down with him a plucky would-be rescuer.

Unerringly the guards hurled a life preserver to the struggling swimmers, hauled them into the boat, and brought them ashore. The man who had called for help was still a bit pale when the keel grated on the sand, but he pulled himself together quickly and slipped away.

Puzzled, I turned to one of the guards. "Didn't he even thank you?"

"Why, no," he replied. "He probably was too much embarrassed. But it's all the same to us. We're not here to gather bouquets."

A STATE OF INFINITE VARIETY

Atlantic City, with its variety and contrasts, is but one of New Jersey's many facets. If variety be the spice of life, New Jersey is a highly seasoned State.

Mountain, plain, and seashore; lakes, forests, and mighty rivers; cities, colonial villages, and suburbs keyed to the modern age; airways, superhighways, electrified railroads, canals, and country lanes; giant industries, craftsmen's shops, universities, historic shrines, manorial estates, and log cabins—New Jersey has them all.

Read its history, or explore its byways, and you find that New Jersey's roots reach back to our early colonial times.

Its coast was sighted in 1524 by Giovanni da Verrazano, a Florentine sailing under French auspices; but the first settlers were the Dutch, who built trading posts at Hobocanhackingh, the present Hoboken, at Paulus Hook (Jersey City), and at Fort Nassau (Gloucester), early in the 17th

"HOW MUCH AM I BID FOR THESE BEANS?"

A unique feature of marketing farm products in New Jersey is the daily auction at farmer-owned and farmer-operated auction markets, such as this one at Cedarville. This selling system handles vast quantities of produce.

Photographs by Edwin L. Wisherd

ASSEMBLING SEWING MACHINES

In the Nation's biggest sewing-machine factory at Elizabeth more than 3,000 types of machines have been made, including those that will sew rubber, leather, and cardboard, as well as cloth. A modern shirt-sewing machine does 4,000 stitches per minute.

© Aëro Service Corporation

FAMOUS AËRIAL PORT IS AN ISLAND IN A SEA OF PINES

Lakehurst afforded anchorage for the huge Navy dirigibles, *Akron* and *Los Angeles*. The latter ship was laid up here temporarily, but was not dismantled so that it could be ready for use again. Into this haven Dr. Hugo Eckener piloted the *Graf Zeppelin* after its world-circling flight.

century. Then came Walloons and French Huguenots, and the Swedes on the Delaware.

Finally the English, Scotch, and Irish took over the region and absorbed the remnants of early settlers. Thus New Jersey became an English colony with a rich racial background.

Once there were two "Jerseys," an East New Jersey, with its capital at Perth Amboy, and a West New Jersey, with capitals at Salem and Burlington (see map, p. 521).

Before the Revolution East New Jersey was sold at public auction to William Penn and a group of Quaker associates, who already held West New Jersey. William Penn gained his first colonizing experience in New Jersey, years before his Pennsylvania venture (see illustration, page 570).

More than an artificial boundary line separated the two "Jerseys." East New Jersey was developed largely by Puritans from New England, while West New Jersey was colonized by the Friends.

This explains why even to-day the upper counties of New Jersey, with their New England village greens, shingled and shuttered houses, and remnants of brownstone Dutch farm buildings, contrast so sharply with the red-brick farmhouses, snow-white doorsteps, and somber Friends' meetinghouses of the counties facing Delaware River and Bay.

At first New Jersey had no name. It was lumped with New York and a part of New England by the Dutch under the title of New Netherlands. Later it was known as "Nova Cæsarea," and finally as New

© Aero Service Corporation

WHEN A CAMPER OR SMOKER IS CARELESS

New Jersey has more than a million acres of timber in the east-central and the northern parts of the State. In the eleven State parks and eight State forests, rangers guard against such forest fires as this, which menaced eastern New Jersey towns.

Jersey, in honor of Sir George Carteret, one of its first proprietors, who had formerly been a governor of the Channel island of Jersey.

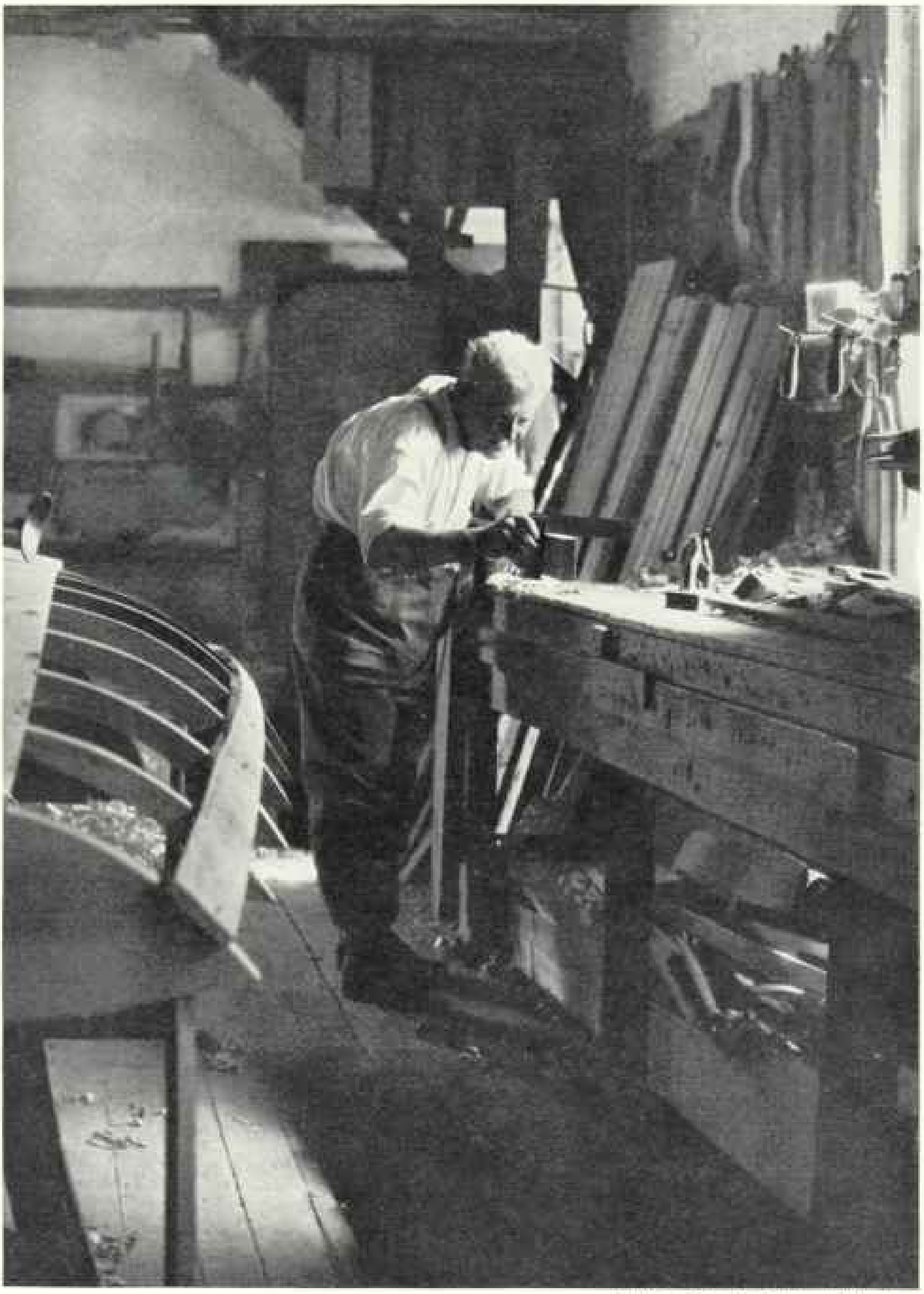
THE INFLUENCE OF GIANT NEIGHBORS SINCE COLONIAL TIMES

Since colonial times New Jersey has felt the overpowering influence of giant neighbors. One section has long been under the spell of Philadelphia, and the other is tributary to New York. But the modern trend of population away from congested centers is in New Jersey's favor. Her 27.6 per cent population growth between 1920 and 1930 was partly at the expense of New York City and Philadelphia.

With the rise of high-speed commuting railroads, beautiful suburbs, and a shorter working week, a change in attitude is apparent among those who spend interstate lives. More and more of their interests, affections, and social life are centered in the community where they make their homes, not where they spend their business hours.

The map shows the State almost surrounded by water. In fact, the proportion of water boundary is greater in New Jersey than in any other State. While rated a "northern" State, at least a third of New Jersey lies south of the Mason and Dixon Line.

Certain geographic features of New Jersey have become virtually generic terms. Mention a "water gap" and the Delaware Water Gap, which New Jersey shares with Pennsylvania, comes to mind. Speak of "palisades" and you think of New Jersey's rocky bulwark overlooking the



Photograph by H. Armstrong Roberts

MASTER OF AN ANCIENT CRAFT

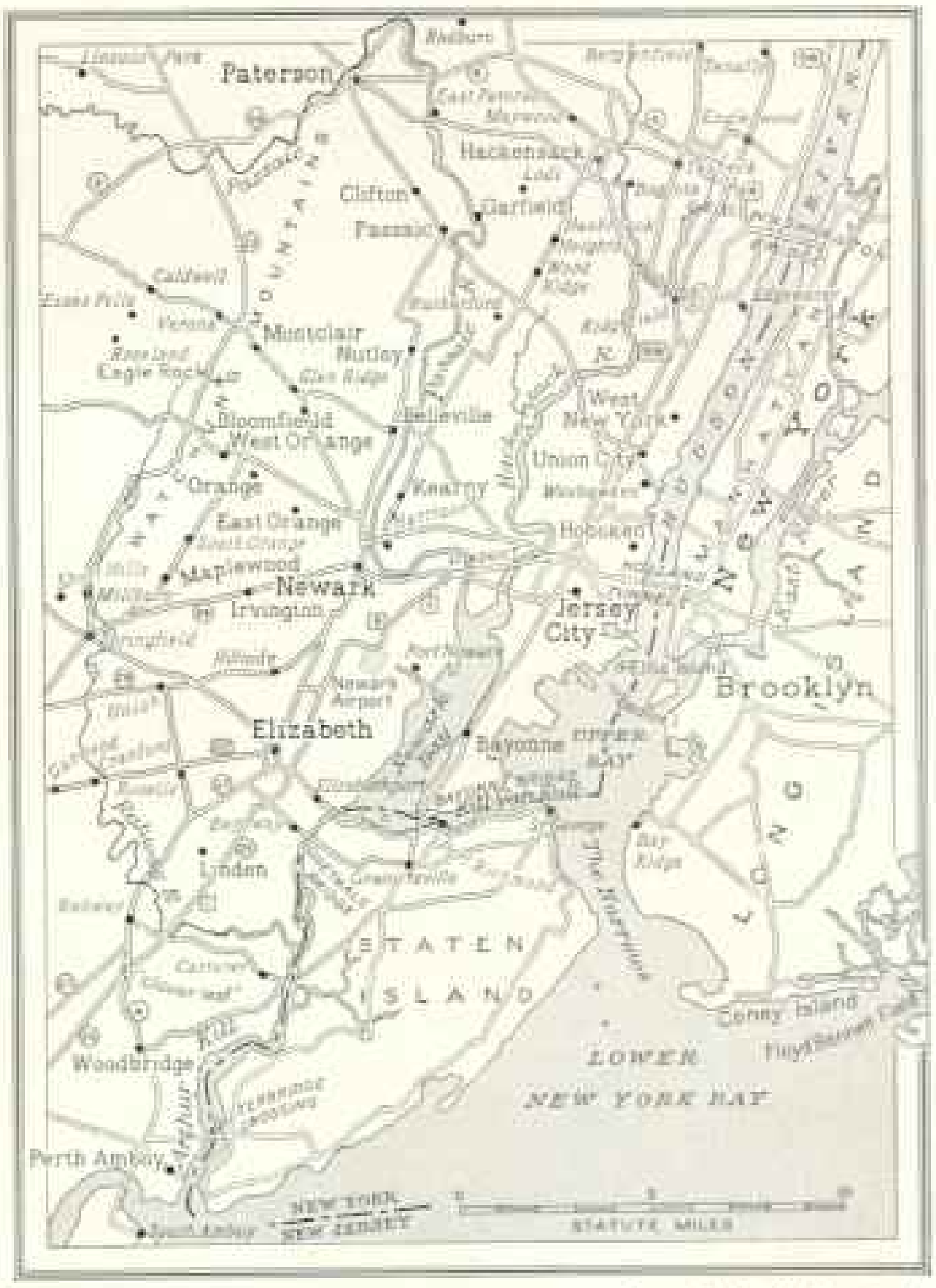
In the colonial days of "iron men and wooden ships" the white cedar, pine, and oak forests of New Jersey fostered busy shipyards along the backwaters of the Atlantic coast and up Delaware Bay. At Camden and at Kearny to-day New Jersey possesses two of the largest shipways in the world (see text, page 556). There also are scores of little shops, similar to this one of a Barnegat Bay boatbuilder, which meet the demand for dories, punts, canoes, launches, and sailing craft.

Hudson. Atlantic Highlands and Sandy Hook furnish their own geographical definition, as do the Jersey "meadows," once famed for their big mosquitoes.

The easy way to explore New Jersey now is by motor over its 1,300 miles of paved State highways and 4,000 miles of county roads, mostly surfaced. Even the villages and almost every farmhouse in the State have all-weather pavement to their doors.

Outline a "figure eight" tour through the State, and you can touch most of its resorts, historic shrines, forest and farm lands, cities and industrial regions, as well as the mountain lakes of the north.

Starting from Atlantic Highlands (see map, page 521), you swing down the east coast, turning west at Delaware Bay; thence through rich farms along the bay and river to Camden and to the State capital, Trenton. Thence across the "waist" of central New Jersey, one of the world's busiest traffic arteries, you push on to the industrial region and suburbs around Newark, with a final loop through the northern counties and back to the seaboard.



Drawn by A. H. Bumstead

NEWARK IS THE HUB OF A MAZE OF COMMUNITIES

The cluster of cities and towns in northeast New Jersey has an aggregate population of nearly 3,000,000. Transportation problems in this congested area have been solved by modernized highways, railroads, and airports geared to high-speed movement of heavy travel.

AN ANIMATED STRIP OF SEACOAST

Nowhere is there a more animated strip of seacoast than the 120 miles of eastern New Jersey facing the Atlantic Ocean. Here, to more than 60 different resorts, millions upon millions of Americans, Canadians, and others come each year in search of health and recreation—to swim, fish, sail, walk, play games, or rest.

Except for occasional intervening inlets or marshy islands, the resorts crowd closely along the beach, one after another. Fishermen's havens, camp-meeting colonies, and private beach clubs of the wealthy march in line with tourist-tent communities, cottage rows, and vast playground cities like Atlantic City, Long Branch, and Asbury Park.

South of Raritan Bay, a network of good highways and railroad lines to-day makes every part of this region accessible. At Atlantic Highlands the road begins to climb—unusual for Jersey seashore roads! But New Jersey has a unique geological

Photograph by Clifton Adams

SURF FISHING FOR DRUM AND BLUES ALONG JERSEY BEACHES

Surf casting is a popular sport along the coast. Long split-bamboo poles are generally used. The butt of the pole is placed in a belt harness for leverage and the heavily weighted hooks are cast just beyond the breaking waves. Clams and crab meat are used for bait, and numerous varieties are taken.

Photograph by Edwin L. Wisherd

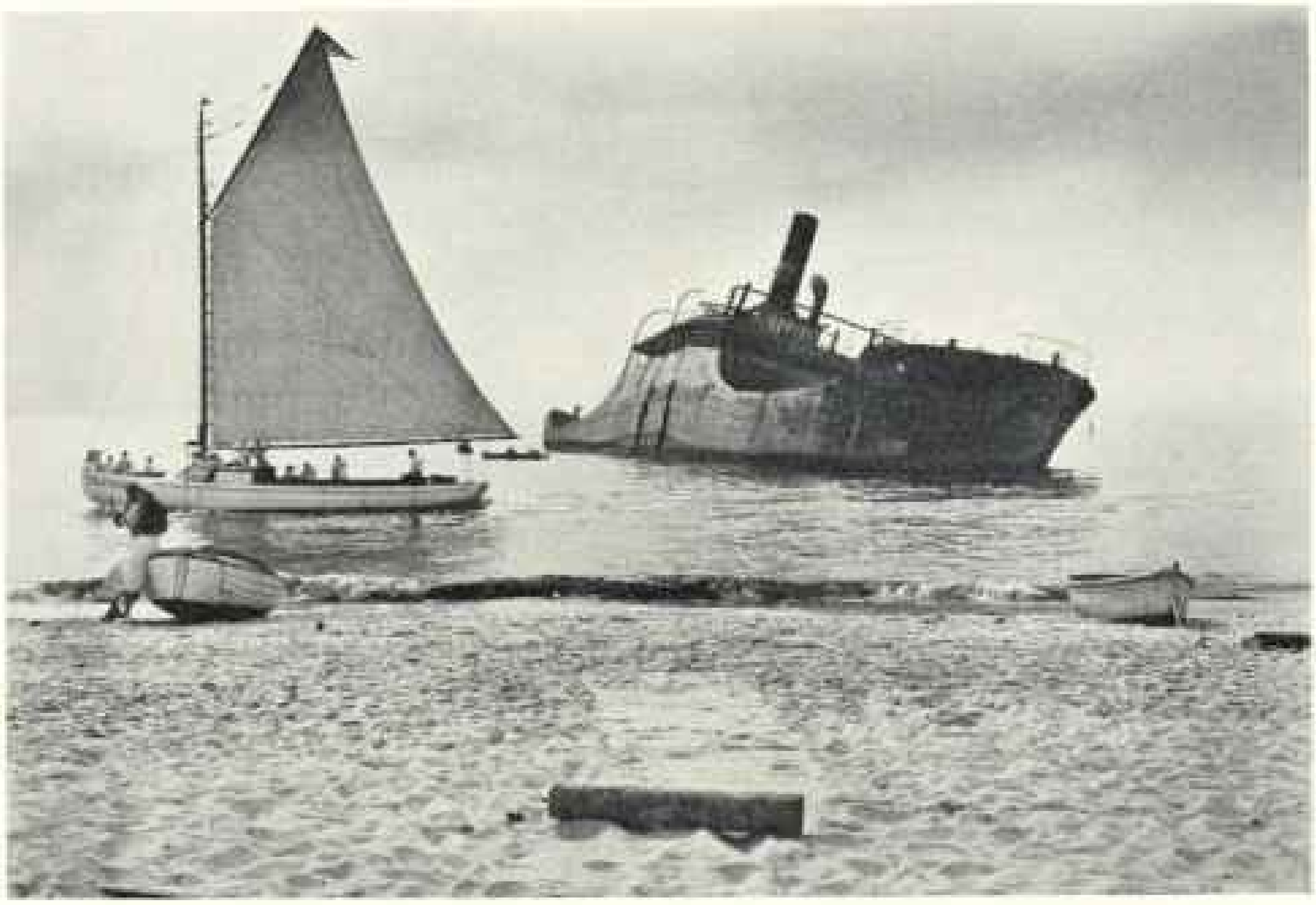
ONLY DWARF TREES GROW ON "THE PLAINS"

In the heart of the Pine Barrens of east-central New Jersey, a few miles inland from Barnegat Bay, is a lonely expanse of sandy soil covered with stunted oak and pine. The vegetation seldom is higher than a man, although this miniature "prairie" is surrounded by forests of normal height (see text, page 343).

Photograph courtesy Western Electric Co.

AT ONE OF THE WORLD'S LARGEST TELEPHONE EQUIPMENT PLANTS

Giant spools of lead-covered telephone cable await shipment by rail, water, and road at Kearny, near Newark. In once-useless meadow land between Kearny and Jersey City scores of industries have been established, including paint and chemical works, a motor assembling factory, New Jersey's second largest shipyards, foundries and machine shops, and rolling mills.



A CONCRETE SHIP "WRECKED" AS A BREAKWATER

When a ferry line was projected between Cape May Point and Lewes, Delaware, a few years ago this battered relic of the World War "bridge of boats" was sunk off "The Point" to protect the ferry landing from ice floes which rush down Delaware Bay each spring. The ferry project was postponed, but the "wreck" remains conspicuous at Cape May.

Photographs by Edwin L. Wisherd

A GLASS BLOWER MUST HAVE LUNGS LIKE BELLOWS

With his entire body in action, like an athlete, this workman in a Millville factory will blow as he rolls a red-hot bubble of glass until it has reached many times its size in the molten state.

formation in the Navesink or Atlantic Highlands, a series of bold, wooded hills which rise almost sheer from the ocean front to a height of nearly four hundred feet.

Navesink Light, one of Uncle Sam's most powerful beacons, crowns this loftiest point on the Atlantic seaboard between Maine and Florida.

In sharp contrast to seaside resorts, the quiet village of Shrewsbury, a short distance inland from Seabright, clusters around its 18th-century Christ Church. One of the oldest towns in the State, Shrewsbury was settled in 1664 by emigrants from Connecticut.

Over the steeple of Christ Church swings a weather vane topped by a coronet. "We are still under the British Crown," the people of Shrewsbury jokingly say.

Outside, in the old graveyard, stands a row of ten small gravestones, each bearing the letter "J." These mark the graves of "the Ten Little Joneses," children of a Mr. and Mrs. Aaron Jones, residents of the parish about the middle of the last century. All died in infancy.

Long Branch, one of the oldest seaside resorts in the United States, attracted visitors from Philadelphia as early as 1750, and in 1806 a hotel which would house 200 people was erected along its beach—a truly giant resort structure for those days.

TWIN COMMUNITIES DIFFER

Now a new ocean drive, in plain view of the surf, runs southward from Long Branch to the twin communities of Asbury Park and Ocean Grove. Although one is very unlike the other to-day, both were founded in 1869 as religious havens, or camp-meeting resorts. With its convention halls, piers, boardwalk shops, theaters, and large hotels, Asbury Park differs sharply from residential, sectarian Ocean Grove.

Life at the latter centers around its vast wooden tabernacle, where, each August, a Methodist "camp meeting" is held. Ocean Grove is closed to vehicular traffic on Sundays. On that day its beach may not be used for bathing or fishing, and nothing is sold in the town shops.

Freehold, the historic seat of Monmouth County, lies a few miles inland from the coast, in the midst of fertile and intensively cultivated farming land. This region is rich in historic associations: of the Battle of Monmouth, that bitter conflict of the Revolution; of sturdy Molly Pitcher, the wife who followed her husband to war and took his place at the gun when he fell wounded; and of Washington's harsh reprimand to Charles Lee, which turned a disorderly retreat of the American forces at Monmouth into victory.

IRON CENTER OF A CENTURY AGO NOW DESERTED

Fascinating to the student of olden times is the "deserted village" of Allaire, a few miles farther south in Monmouth County. Allaire was once the center of a busy iron industry, a "Pittsburgh" or "Youngstown" of the early 19th century (see illustration, page 544). In 1810 the place was at the height of its prosperity. Under the name "Howell Iron Works" it issued its own paper money and made the engines for the first steamer to cross the Atlantic.

When better iron ore and coal were found in Pennsylvania, New Jersey's bog iron-ore industry languished and died. From that time until four years ago Allaire was totally deserted. Now the old brick warehouses, carpenter shop, furnaces, office building, and dwellings echo to the shouts of happy youths at play. A philanthropist has rescued Allaire from oblivion and turned it over to the Boy Scouts.

Memories of Robert Louis Stevenson cling to Manasquan, where the Scottish author wrote part of "The Master of Ballantrae" in 1888. The Union Hotel, rendezvous of literary men and artists of the time, burned several years ago, but old residents recall the "Frail Warrior," wrapped in a long dark cloak, who stalked up and down the banks of the river.

Bay Head, as its name implies, marks the extreme northern end of a miniature inland sea from one to five miles wide, extending southward through Barnegat Bay, Little Egg Harbor, and other inland waterways to Cape May. Here, too, begin those narrow strips of sand, broken at intervals, on which stand many of the newer coast resorts (see illustration, page 548).

A few miles inland lie the Pines, an extensive, sparsely settled forest of rare loveliness, where the invigorating scent of yellow pitch pine has led to the building of several health resorts, chief of which is Lakewood. Unlike its seacoast cousins, Lakewood is at its best in the spring and fall, when many come here to play

© National Geographic Society Finlay Photograph by Edwin L. Wisherd

LONELY BARNEGAT LIGHT

This most renowned of New Jersey lighthouses still flashes a friendly warning to mariners. It is especially valuable to small craft entering Barnegat Inlet. A lightship offshore indicates the point where the coast bends like an elbow from an almost north-south line to southwest. The venerable beacon was built in 1858.

© National Geographic Society

Finlay Photograph by Edwin L. Wisherd

FANTASTIC TOWERS OVERLOOK ATLANTIC CITY'S SURF

On a sunny Fourth of July or a Labor Day week-end as many as 400,000 visitors have converged upon this ten-mile-long strip of ocean front. Most of them take a salt water or a sun bath. All of them, during their visit, stroll along the Boardwalk, one of the world's famous promenades.

© National Geographic Society

Pillsbury Photograph by Edwin L. Wisherd

MODERN SUN-WORSHIPERS ON THE NEW JERSEY SANDS

Wildwood, one of the newest of New Jersey resorts, is situated on the peninsula tipped by Cape May. In summer it is swept by breezes from Delaware Bay and the Atlantic Ocean.

NEWARK AIRPORT IS THE WORLD'S BUSIEST

One may board a comfortable transport plane at Newark airport and travel by air to 20 nations in North and South America, or to any of the major cities of the United States. In the background rises the new skyline of Newark.

© National Geographic Society Finlay Photographs by Edwin L. Wisherd

ART EXPRESSES ITSELF IN SAND

Lean upon the Boardwalk rail and sand artists at Atlantic City will sketch your profile on a sheet of paper and hand it to you as a souvenir. They may even hazard a guess about you: "Business Man," "Movie Star," "Judge," or, if in doubt, "A Regular Guy!"

THEY BRING THEIR "HOTEL" WITH THEM!

The Tent City at Wildwood is one of the largest tourist camps on a beach in the United States. To it motorists come, gypsylike, with all the equipment needed for a seashore week-end. Beach pajamas and a bathing suit are ample wardrobe.

© National Geographic Society Finlay Photographs by Edwin L. Wisherd

FOR QUICKER RESCUES AT SEA

When two seamen were severely injured in a boiler explosion on a ship off the Jersey coast, this Cape May Coast Guard plane saved their lives by picking them up at sea and transferring them to a Philadelphia hospital in less than two hours' time.

© National Geographic Society

Finlay Photograph by Edwin L. Wisherd

WHERE ALEXANDER HAMILTON MET DEATH IN A DUEL WITH AARON BURR

The old dueling ground on the heights above Weehawken affords a sweeping view across the Hudson River of the new giants of mid-town New York. On the right is the Empire State Building; on the left the shaft of "Radio City." The pencil-like peak in the center of the picture is the Chrysler Building.

© National Geographic Society

Finlay Photograph by Edwin L. Wisherd

AN OLD CANAL BORDERS THE DELAWARE RIVER ABOVE TRENTON

A few miles north of this spot George Washington and his Continental Army crossed the ice-choked Delaware on the night of December 25, 1776. Each side of the Delaware at Washington Crossing has been set aside as a State Park, the west bank by Pennsylvania and the east bank by New Jersey.

ADDING COLOR TO ARCHITECTURE

From the terra-cotta works of Perth Amboy came the glistening faces of many buildings in the United States, Cuba, South America, Australia, South Africa, and Japan. The Woolworth Building, the Philadelphia Museum of Art, Miami City Hall, and the Cuban Telephone Building in Havana are notable examples of terra-cotta-faced structures.

© National Geographic Society Finlay Photographs by Edwin L. Wisherd

NEW JERSEY LEADS IN SANITARY WARE

Modern bathroom fixtures of many hues in a Trenton pottery. New Jersey ranks first in the mining of raw clay and second in the manufacture of clay products, which include dishes, tile, bricks, terra cotta, and sanitary ware. The principal clay beds lie in the marl belt between Raritan Bay and Camden.

golf, ride horseback, or walk along sylvan pathways under the pines.

In the Pines, too, is Lakehurst, the home "port" of the Navy's giant dirigibles, *Akron* and *Los Angeles* (see page 526).

There is something reminiscent of the English Fens * in the district around Toms River, a long, winding estuary running back from Barnegat Bay. The little town of Toms River, with its shaded green lawns running down to blue water, and its fleet of white yachts and mahogany-cabin cruisers, is one of New Jersey's most alluring spots.

TROUBLE AT DOUBLE TROUBLE

New Jersey has many odd and curious place names: Ongs Hat, Cheesequake, Bivalve, Peapack, Mount Misery, Colts Neck, etc., each with a fascinating origin. But no one mentioned Double Trouble, which I found on the map while driving south from Toms River.

But when I tried to get to Double Trouble my troubles began. No one seemed to have the same opinion about sand roads back in the Pines. A road-repair crew came to my rescue and presently I was driving along two white sand ruts, winding among tall pines and dense shrubbery which crowded close to the running board of the car.

Five miles of desolation and then the trees thinned out. Ahead straggled a few houses and a building or two, and beyond them stretched vast clearings in the forest, covered with a short, bushy growth. I called to a man standing in front of one of the houses: "Am I on the right road to Double Trouble?"

"You're in it," he replied. Then I noticed a sign on one of the smaller buildings: "Troublesome Laboratory."

Double Trouble is a cranberry center, named by an early pioneer who had difficulty in keeping a mill-pond dam from washing out. In Troublesome Laboratory many ideas in cranberry culture have been worked out. It was my first sight of a cranberry bog and of an agricultural industry in which New Jersey ranks second among the States of the Union (see illustration, page 544).

A cranberry bog has many surprises for the uninitiated. Cranberries grow on tiny bushes no higher above the ground than the length of a man's hand. And the bogs are as dry as tinder most of the year. Water must be available, and there must be dams, dikes, and ditches so that the bogs may be flooded. But flooding is employed only to kill certain insects, and to protect the cranberry plants from severe cold. The cranberry region in winter is a beautiful land of man-made lakes—vast, shallow ponds that mirror the clouds and encircling pines.

A little farther south and a few miles inland from Barnegat Bay, along the lonely border between Ocean and Burlington counties, New Jersey has a strange and deserted expanse of waste land known as "the Plains." The pine forests come to a sudden halt, as if they had been sheared off by a giant lawn mower. Then, as far as the eye can reach, stretch gently rolling plains clothed in dwarf trees and bushes, none more than three or four feet high (see illustration, page 531).

Most of the year the Plains are desolate and forbidding; but in spring, when the pink laurel is in bloom, or during the autumn, when the oak leaves turn to scarlet, the region has a compelling beauty.

At Manahawkin, on the trunk highway that follows the coast, a new causeway strikes out over the marshes to Long Beach, the loneliest and least-known section of the New Jersey seaboard. Here one may drive for miles among rolling, grass-covered dunes, where only an occasional Coast Guard station recalls civilization. At the extreme northern end of the island rises the deserted shaft of Barnegat Light, most renowned of Jersey lighthouses (see Color Plate I).

Barnegat abounds in legends of bay-men and marshmen, and of freebooters who once hung a lantern around a bobbled mare's neck, luring cargo boats to destruction on the beach. Mariners seeing the bobbing light mistook it for another ship in safe water, but upon drawing near their ships were wrecked and valuable cargoes strewn upon the sand. Here, too, are "singing sands," lonely stretches of beach where large, coarse grains whistle underfoot and make strange whining noises in a heavy gale.

* See "A Tour in the English Fenland," by Christopher Marlowe, in the NATIONAL GEOGRAPHIC MAGAZINE for May, 1929.

ONCE ITS STACK BELCHED SMOKE AND FLAME

This brick blast furnace of a deserted iron works at Allaire is a memento of the time when the community near Asbury Park had high hopes of becoming a thriving Pittsburgh. The ore came from bogs in the vicinity and near-by forests supplied charcoal to refine it (see page 534).

Photographs by Edwin L. Wisherd

A CRANBERRY SCOOP IN ACTION

Much of the crop is picked by hand, although scoops similar to this one in use at Double Trouble are often employed. The bogs are flooded in winter months to kill insects and to protect the plants from severe cold. New Jersey ranks second among the States in cranberry crops (see text, page 543).

Photograph from Dr. Frederick V. Coville

NEW JERSEY RAISES 95 PER CENT OF THE NATION'S IMPROVED, CULTIVATED BLUEBERRY CROP

When given the care usually bestowed on cultivated crops, the blueberry sickens and dies; but pine barrens afford a type of acid soil and climate ideally suited to the development of large berries. Those in this photograph are reproduced normal size.

Photograph by Edwin L. Wisherd

MANY SHAVING TUBES ARE MADE OF PURE TIN, OTHERS ARE FASHIONED FROM ALUMINUM

In this Bloomfield tube factory tin disks, like "plug nickels," are first pressed into shape by plungers, a process comparable to pushing one's hand into dough in a cup, forcing the dough up around the wrist. Then the tubes are sent to the lithographing machine for labeling.

Photograph by H. Armstrong Roberts

BIVALVE IS A MINIATURE BALTIMORE FOR SEA FOOD

A part of the Delaware Bay oyster fleet is tied up at the aptly-named town on the Maurice River. In addition to oysters and clams, lower Delaware Bay is rich in food fishes, and whales once were caught near its mouth.

Ocean City, farther down the coast, is linked with Atlantic City's Absecon Island by a new steel bridge. Some day all the island resorts will be connected by highway bridges. Ocean City is one of the gateways to Cape May County, "New Jersey's Way Down East" (see page 556).

CAPE MAY SMACKS OF THE SEA

While Cape May was discovered by Henry Hudson in the *Half Moon* in 1609, and was named for the Dutch navigator, Cornelius Jacobsen Mey, who explored it in 1621, its first settlers were whalers from Cape Cod and Long Island.

Their village, Town Bank, stood on the protected bay shore about five miles north of the present city of Cape May Point (see map, page 521). No trace of it remains. But during the latter part of the 17th century many whales were caught, dragged ashore here, cut up, and whale oil was boiled from the blubber.

Relics of early whaling days on Cape May—kettles, whalebones, harpoons, etc.—may still be seen in the historical museum at Cape May Court House.

Everything about Cape May City to-day smacks of the sea. Half hidden in fine old trees stand many imposing homes of merchant princes and rich sea captains of the last century, a few of them topped with lookouts, or "widow's walks," from which ships at sea could be sighted.

Here and there, too, are cozy cottages of other seamen who have "swallowed the anchor," and settled down to a peaceful old age in this quiet community. Even the weekly newspaper, *The Star and Wave*, has a "seagoin'" name.

Cape May City is one of the oldest seashore resorts in the United States. Advertisements describing its beach, horseback riding, and tavern appeared in Philadelphia newspapers as early as 1776, and it was popular after the Revolution.

COLONIAL RUTGERS OVERLOOKS THE BANKS OF THE RARITAN

"Old Queens," housing the University offices, was erected in New Brunswick a century and a quarter ago. Its name commemorates that of the original institution, Queen's College, founded ten years before our Declaration of Independence year. Later the name Rutgers was adopted and in 1917 the college was designated the State University of New Jersey.

Photographs by Edwin L. Wisherd

THE SUBMARINE SUPPLIES ITS OWN MEMORIAL

John P. Holland conducted early experiments with submarines in the Passaic River. This model, launched in 1881, is in Westside Park, Paterson. It has a displacement of 19 tons and is 31 feet long. With two men aboard, it operated at a depth of sixty feet.

© Aëro Service Corporation

SOUTH OF BAY HEAD THE COAST CHANGES

Near the lower left corner of the picture is Sea Girt, summer home of New Jersey Governors; beyond it lies Manasquan, and, where the island strip begins, left center, is Bay Head, at the head of Barnegat Bay. The long, narrow strip of sand beyond is Island Beach, ending at Barnegat Inlet, where the coastline bends to the southwest (see map, page 521).

Until the Civil War it led in visitors all other seaside water places, most of them coming from Philadelphia, Baltimore, and Washington.

During President Benjamin Harrison's administration the "Summer White House" was at Cape May, and the gay diplomatic life of the latter part of the 19th century centered around its spacious and rambling wooden hotels, several of which still stand.

To-day Cape May's principal industry is fishing. The annual catch of mackerel, bass, tuna, and other food fishes landed in its harbor is valued at more than $2,500,000. Dredges and breakwaters have given it the largest and deepest harbor among the New Jersey resorts. In the early spring the mackerel fleet from Boston and Gloucester, Massachusetts, ties up at its wharves.

Let us now leave "holiday land" and swing westward into the four southwestern counties of New Jersey—Cumberland, Salem, Gloucester, and Camden—a little empire of rich farming land. Onward we roll through acre after acre of tomatoes, beans, cauliflower, eggplant, cabbages, and sweet potatoes. Most of the produce finds a ready market in the busy canneries of the city of Camden and the fresh vegetable stores of Philadelphia and New York City.

Here, too, are the silicon deposits that give Millville and Bridgeton a prosperous glass industry; the peach orchards of an important fruit belt; large poultry farms in the vicinity of Vineland; and the oyster beds and fisheries of the Delaware Bay

A HIGHWAY BRIDGE THAT WON AN ARCHITECTURAL PRIZE

This structure carries the four-lane "superhighway" over the Raritan River near New Brunswick. The bridge is part of a "by-pass" around the city (see text, page 558). Morris Goodkind, the State Highway Commission engineer who designed it, was awarded the Phebe Hobson Fowler architectural award for 1930.

region that make the town of Bivalve, at the mouth of the Maurice River, a miniature Baltimore for sea food (see p. 546).

Plumes of smoke from the glass works in Millville seem strangely out of place as we drive through the farms of Cumberland County. Part of the nearly pure quartz sand dug in southern New Jersey is pulverized and used in the manufacture of scouring soaps, face powder, pottery, paints, and metal polish.

NEW JERSEY'S "TEA PARTY"

If you follow the main highway from Millville to Salem you will miss the little river port of Greenwich, scene of the "New Jersey tea party," counterpart of similar "festivities" in Boston and Annapolis prior to the American Revolution.

In November, 1774, the brig *Greyhound* landed a cargo of tea at Greenwich. Feeling against the Stamp Act was as high in southern New Jersey as it was on Boston Common, so the tea was stored for safety in a small warehouse in the town.

On the night of November 22 forty prominent residents of the district, disguised as Indians, raided the warehouse, piled the tea in a near-by field, and burned it. A stone monument to-day commemorates this patriotic bonfire, while the old warehouse forms part of a residence.

Salem, a little farther west, is one of the most interesting old towns in the State. Trees shade its streets and its tall, white-shuttered, red-brick mansions. The first English settlement in New Jersey was established near Salem, and the town itself

Photograph courtesy Campbell Soup Co.

TOMATOES EN ROUTE TO THE KETTLES

A final inspection after sixteen washings in a Camden soup factory. As the tomatoes move along on endless conveyors the imperfect ones are removed (see text, page 552).

was laid out in 1675. Before the English came, the Swedes, in 1642, built one of their early strongholds on the Salem River near the present city. This outpost, called Fort Elfsborg, exacted salutes from Dutch vessels sailing up the bay.

Eventually, however, its garrison was routed, not by the Dutch, English, or Indians, but by an earlier resident still, the forbears of the famous New Jersey mosquito!

CAMDEN CANS SOUP FOR THE WORLD

North of Salem (on the river road to Camden), Pennsville and Penns Grove, each a terminal of busy ferry lines to Delaware, remind us that New Jersey, not Pennsylvania, witnessed William Penn's first efforts at colonization on the American Continent (see page 570).

A short distance inland, in the heart of the sweet-potato and tomato-raising belt, the name Swedesboro recalls hardy Scandinavian pioneers.

When the Walrus in "Alice in Wonderland" said that the time had come to speak of many things, "of shoes, and ships, and sealing wax, and cabbages and kings," he might have had Camden in mind, so well did he suggest the chief aspects of New Jersey's southern metropolis to-day.

For Camden manufactures much of our "patent leather" that brightens shoes; it has the largest privately owned shipyard in the United States; "sealing wax," in the form of phonograph records made in Camden, preserves the art of famous musicians and speakers; "cabbages," tomatoes, peas, and other vegetables from near-by New Jersey gardens help to make Camden the country's greatest soup-canning center; and for a "king" Camden may point to noble Walt Whitman, who lived, died, and is buried in the city.

Camden's spirit of progress is exemplified in a lofty new City Hall and County Building; the magnificent suspension bridge linking it with Philadelphia; its air-

Photograph courtesy Campbell Soup Co.

THE GENESIS OF GUMBO SOUP

Okra thrives in Jersey soil, where vast acreage is given over to vegetables for adjacent cities and for the soup-makers.

port (which also serves as the principal airport for Philadelphia); and municipal docks along the Delaware River.

The great soup and vegetable canning factories of Camden furnish an outlet for thousands of truck farms, big and little, that spread over the southern counties of New Jersey. In Camden originated the idea of concentrated or condensed soups, saving almost half the previous cost in canning, labeling, packing, storage, and shipping (see Color Plate X).

THE GEOGRAPHY OF CAMDEN'S "SOUP EXCHANGE"

For those who have sensitive olfactory nerves, a soup factory is a congenial place. Giant nickel kettles waft the odors of steaming fresh vegetables, chickens, and beef. Cleanliness is a watchword. Scalding water taps are everywhere, to clean utensils before and after using.

Few industries involve so far-reaching an exchange of commodities as does Camden's soup industry. From here soups go forth into every country in the civilized world, and in turn the industry draws upon the canning industries of eleven States to assist its own kitchens in preparing the purée from which soup is made.

Last year one of the leading single outlets for steel tonnage in the United States was tin plate, and a lion's share of the tin plate that went into the making of tin cans found its way to Camden.

Meats for Camden's soups came from 29 States; the poultry from 13; creamery butter from 16. To obtain piquant spices, buyers went to the ends of the earth. They brought back bay leaves from Asia Minor; ginger from China; black peppercorns from the Malabar Coast of India; cloves from Zanzibar; nutmegs and mace from the Banda Islands; fenugreek from Anatolia; cinnamon from Ceylon; cumin from the island of Malta; mangoes from the Philippines; saffron from Austria; rare condiments from everywhere.

Photograph by Clifton Adams

A VISTA OF PHILADELPHIA FROM A CAMDEN FERRY SLIP

To the Delaware River wharves of Camden big freighters, such as the one shown moving upstream, bring leather, tobacco, cork, licorice, wax, spices, and other raw materials for busy factories. In return the city sends an amazing variety of products to the distant places of the earth (see text, page 550).

Back to these distant lands go the brews of Camden. Open the periodicals of the world and you will find the message of this Camden industry. A Filipino weekly printed in the Tagalog language, the *Morganbladid* of Reykjavik, Iceland, and a flaring window banner in Sweden—all extol the merits of Campbell's soups, for the industry is one of the earliest and most consistent believers in the adage, "It pays to advertise."

I asked the manager of Camden's largest soup factory how many cans were turned out in a year. I said I would like to build an imaginary pile of cans and compare it with the Empire State Building or with Pikes Peak.

"I can give you the figure," he replied, "but I would rather not. We emphasize quality rather than quantity. In spite of the rapid expansion of the business in recent years, we have not enlarged the size of our kettles, nor have we sacrificed hand preparation of ingredients. We added more kettles and took on more help, but processes have not changed."

A modern soup factory is an old-fashioned kitchen on a large scale. Rows of women and girls sit at long tables, peeling and carving vegetables and meats. One row cuts up freshly cooked chickens, another peels potatoes and onions (only the eyes of the newcomers water!), and another shells peas.

There is no guesswork about mixing ingredients. Everything is carefully measured on scales. Clattering cans ride into the canning room on an overhead belt and spiral downward to the filling machines. Tops are no longer soldered on. A special

Photograph by E. John Long

CHILDREN BESIEGE THE "GINGERBREAD CASTLE" AT HAMBURG

"The walls are made of gingerbread, the roof of cake icing, but if you touch them they will turn to stone," a guide cautions young visitors to this quaint reproduction of the home of Hänsel and Gretel. The Castle was built by a philanthropist fond of fairy tales and children.

sealing material is put under the lids and pressure does the rest. A hot journey through a steam bath sterilizes both can and contents.

It is but a step in Camden from kitchens that please taste and smell to plants making instruments to charm the ear.

CAMDEN'S "RADIO CENTER"

What a Tower of Babel is the modern phonograph and radio factory! Every machine must be tested, and at times the checking department, with squeals, howls, snatches of voices, and other noises, sounds like morning in a barnyard. The "Tower of Babel" is further borne out in the foreign record department, where disks in forty different languages are made. Polish and Slav records lead all others.

Camden's vast phonograph and radio enterprises spread over several acres of water-front ground known as "the Radio Center." In Camden the disk phonograph was perfected, and here are made many thousands of phonograph and radio sets, phonograph records, and motion-picture sound sequences.

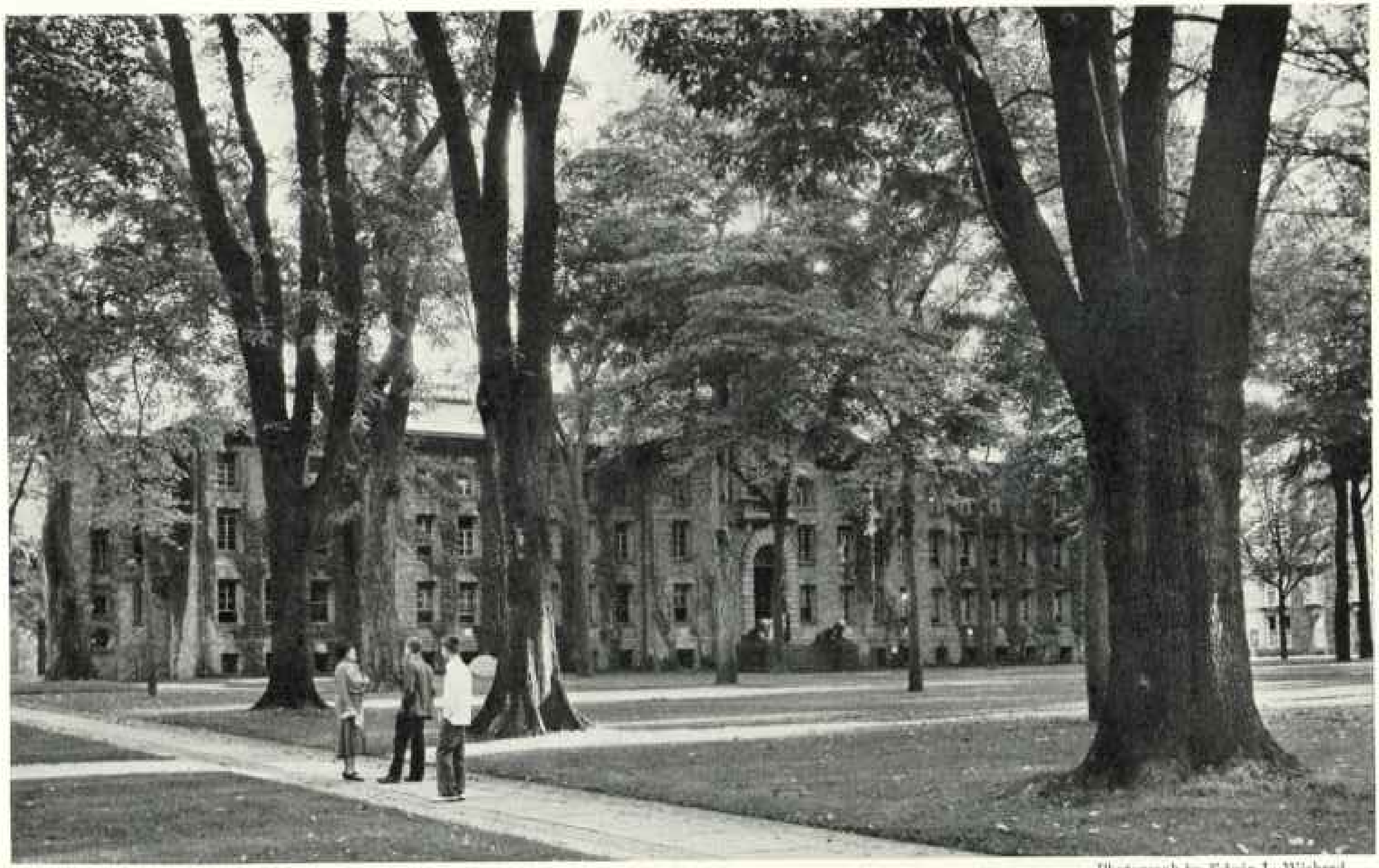
One division has recently succeeded in reproducing bell sounds with marvelous fidelity by the use of tiny curled strips of metal. Electrical devices amplify hundreds of times the vibrations which these "pigtails" give off when struck with a key. With a small cabinet and several loudspeakers, any building may have a "singing tower" without bells or a heavy supporting tower.

A remarkable recent accomplishment of Camden's acoustical engineers is the "rejuvenation" of old but popular phonograph

Photograph by Rotofotos

A TOUCH OF OLD ENGLAND IN NEW JERSEY

The Essex Fox Hounds move off at Vletown, near Gladstone (see map, page 521). The roadway winds among the gently rolling hills, past old stone farmhouses set in groves of trees. Fox-hunting and paper chases are popular in Morris and Somerset counties.



Photograph by Edwin L. Wisherd

PRINCETON MEN SING OF "GOING BACK TO NASSAU HALL"

This venerable structure, completed in 1756, now an administration building, is the shrine of the University. In it the Continental Congress met in 1783. During the Revolution it served alternately as barracks and hospital for British and for American troops. Colonial Americans pointed proudly to an academic building of such enormous size (see text, page 567).

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CAPE MAY PENINSULA: JERSEY'S "WAY DOWN EAST"

To the left stretches the open Atlantic; to the right is Delaware Bay. This panorama from the air reveals the old Atlantic shore line (cutting obliquely along the center), now four miles inland. The white sandy islands to the left extend along the ocean front from Cape May to Bay Head. In the marshes between the old shore and new, land is slowly forming. The town in the middle distance is Cape May Court House; to the left, across the marshes, lies Wildwood. The cities of Cape May and Cape May Point stand at the extreme end of the peninsula.

records, made in the days when the mechanics of record-making did not permit the full reproduction of voices and accompaniment.

Using master records, the engineers stripped away the old, tinny, mechanical accompaniment, but left the vocal part of the record unharmed. Then they added a new, modern orchestra accompaniment to the voice—a revelation of what modern recording methods may do.

TOOLS OF THE WRITTEN WORD

Camden also fashions the tools of the written word. A steel pen point, which seems such a simple thing at first glance, requires nine different operations in the making. In the world's largest steel-point factory, Camden turns out some 200,000,000 of these useful bits of metal annually.

If a year's output of Camden's chief steel-pen factory were made into one huge pen, it would be 65 feet high, a foot thick, and 13 feet wide. Until this industry was founded in Camden, in 1858, most of the steel pens used in this country were imported from abroad. Now Camden ships steel and fountain pens to every part of the world.

Down the greased ways of Camden's shipyards have glided three of the four biggest ships launched in this country and nearly 20 per cent of the vessel tonnage now comprising the United States Navy.

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THE SPIRES OF PRINCETON RECALL CLASSIC OXFORD

The Graduate College of the University occupies this group of buildings southwest of the main campus. Student apartments and a spacious dining hall adjoin the stately Cleveland Tower, 173 feet high. Along the top of the picture is the edge of the campus of Princeton Theological Seminary, organized by the General Assembly of the Presbyterian Church in 1812.

During the past 28 years Camden's shipways have built some 400 vessels, including warships for foreign navies.

Toward the construction of a giant merchant liner every State in the Union contributes. In addition to the more obvious items, such as steel, wood, paint, and machinery, there are other materials: oakum from Maryland, ebony asbestos from New Hampshire, gypsum from Nevada, mica from Virginia, silver from Arizona, hemp from Kentucky, and scores of other products.

Camden has dozens of other industries. Cork products, cigars, machinery, licorice products, printing, shoes, books, and linoleum stand out in a list of more than 300 diversified manufactures.

Walt Whitman, the "good gray poet," spent the last nineteen years of his life in Camden. The simple frame house where he wrote several of his later poems, and where he died in 1892, has been preserved in the heart of Camden's industrial district as a shrine. Hundreds each year visit also beautiful Harleigh Cemetery, where the genius, whose "Leaves of Grass" has been translated into twenty-five languages, rests in a massive tomb of granite surrounded by beeches and rhododendron.

"GOLF TOWNS" ARE UNIQUE MUNICIPALITIES

Near Haddonfield are two of America's unique municipalities, the "golf towns" of Tavistock and Pine Valley. Each "town" consists only of a golf course and clubhouse, and the town officials are the officers

of the club. "Blue laws" prohibit playing golf on Sundays, but the enforcement of the laws rests in the hands of local officials, and the clubs, incorporated as boroughs, escape outside interference.

Not far from Camden, at Mount Holly, lived and wrote John Woolman, a noted Quaker and one of America's earliest foes of slavery; at Indian Mills was established one of the first Indian reservations in the United States; and at Camp Dix Uncle Sam trained many soldiers of the American Expeditionary Force during the World War. Whitesbog, in the Pine Belt, has the largest cranberry and blueberry plantations in the State. This is the center of the industry.*

TRUNK HIGHWAYS CIRCLE CITIES

But our route carries us northeast along the Delaware. From Camden a new arterial highway speeds one directly from the traffic circle at Camden Airport into Jersey City and New York without passing through the congested parts of any towns or cities. Burlington, Bordentown, Trenton, New Brunswick, Elizabeth, and Newark are "by-passed"—that is, the trunk road is run around them, or avoids them by short cuts which do not follow old turnpikes (see illustration, page 549).

All of these places offer enticing detours. In Burlington the birthplace of James Fenimore Cooper stands beside the home of Capt. James Lawrence, who, mortally wounded, gave to the American Navy the slogan, "Don't Give Up the Ship."

To me, however, Burlington's most distinctive relic is the office of the West New Jersey Proprietors, a little one-story brick structure on Broad Street. It shares, with a similar building of the East New Jersey Proprietors in Perth Amboy, the distinction of being a corporate link with the government of colonial times (see page 570).

The two buildings hold the earliest land deeds in New Jersey. They are controlled by boards which claim the rights and privileges of the original vested Proprietors, never canceled by law. Not even the State Capitol at Trenton has as complete a record of early deeds as these two offices.

Each year, on April 10, rain or shine, an ancient ceremony is enacted on the streets of Burlington in front of the Surveyor General's Office (as it is called). Five members of the "Council of Proprietors" are elected, as they have been since 1688. In case of rain, the meeting takes place under umbrellas. Another four officers are elected three days later in Gloucester.

"The Proprietors" are, to all intents and purposes, corporations. They have never, however, been incorporated under the authority of any law. Their legal status has been held to be a corporation by prescription. Their relation to the State of New Jersey is anomalous, one of those queer kinks in the law that has been uncontested.

Bordentown, another historic Delaware river port, has the first public school in New Jersey, where Clara Barton, founder of the American Red Cross, taught; the beautiful estate of Joseph Bonaparte, exiled King of Spain; and the home of Francis Hopkinson, chairman of the committee on designing the American Flag and father of Joseph Hopkinson, author of "Hail, Columbia." Bordentown last summer celebrated its 250th anniversary.

Trenton, New Jersey's busy capital, blends history with modern industry. In its snow-covered streets Washington and his half-frozen Colonials surprised Hessian troops the day after Christmas, 1776, and won the first decisive American victory of the Revolution.

CONGRESS ONCE MET AT TRENTON

Trenton shares with New York, Philadelphia, Baltimore, Lancaster, York, Princeton, and Annapolis the distinction of having been a temporary capital of the country. In 1783 Trenton was proposed as the seat of the Federal Government, and from November 1 to December 24, 1784, while the proposal was still under consideration, the Continental Congress met here. Trenton did not become the capital of the State of New Jersey, however, until 1790.

Ever since Mahlon Stacy erected his mill along the shores of Assunpink Creek (now within the city), Trenton's growth has been paced by an ever-increasing number of products, ranging from pottery, tires, and lamps, to cigars, brake linings, and steel cables.

"Trenton Makes, the World Takes." A new channel down the Delaware to the sea permits ocean freighters to take on and to unload cargoes at the city's door.

* See "The Wild Blueberry Tamed," by Frederick V. Coville, in the NATIONAL GEOGRAPHIC MAGAZINE for June, 1916.

RAW MATERIAL FOR SOUP AND CATCHUP

New Jersey, often called "The Garden State," ranks high in the production of tomatoes for canning. Many of its tomato seedlings are planted in Georgia and the Carolinas, and are transplanted to Jersey soil after the last frost is gone.

© National Geographic Society Finlay Photographs by Edwin L. Wisherd

IMPERIAL PURPLE FROM A SANDY SOIL

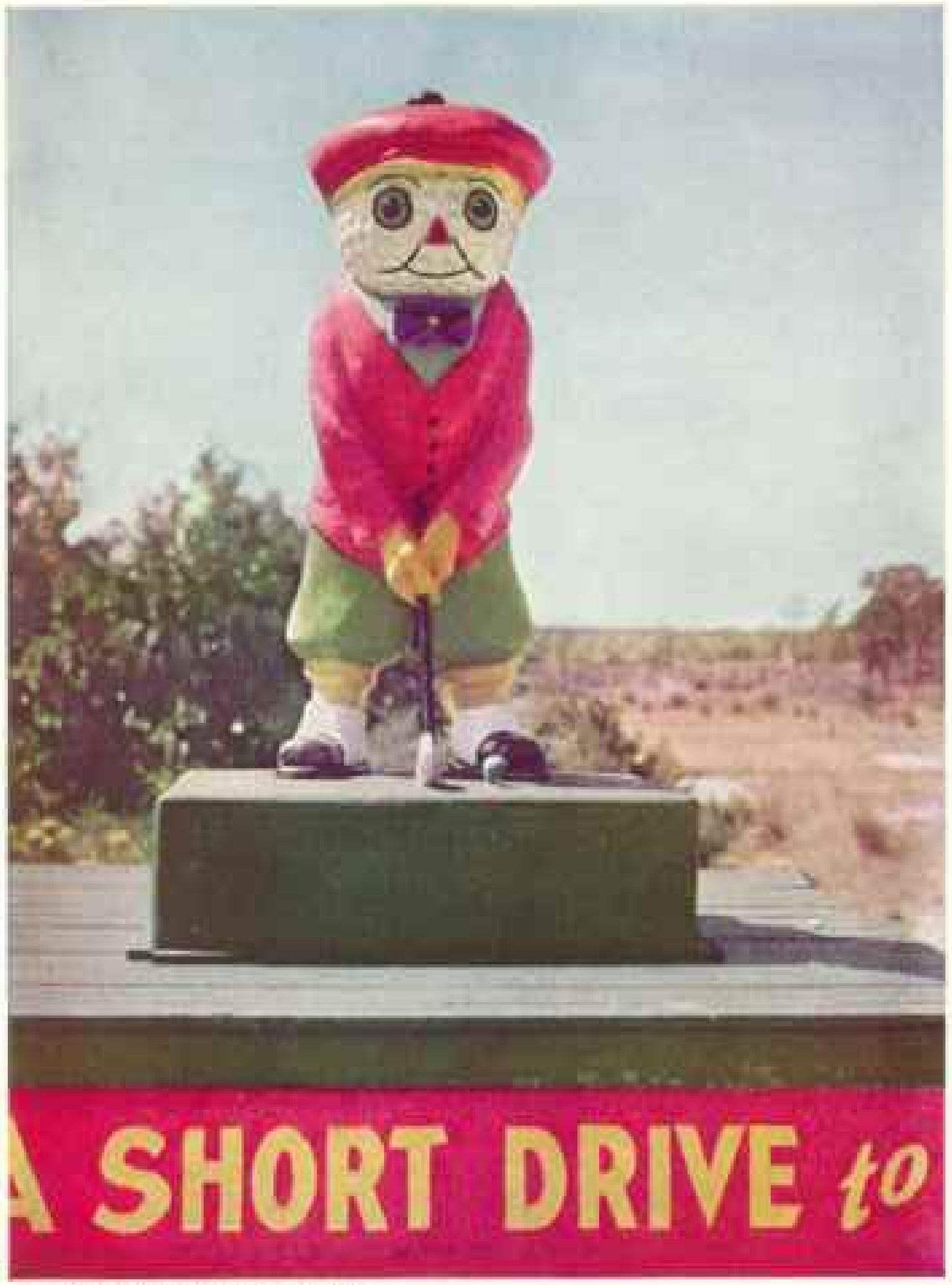
Eggplant farms, such as this at Bridgeton, cover a large area in the southern part of the State, where the light sandy loam warms up quickly in the early spring. Every eggplant is carefully "polished" before it is sent to market.

© National Geographic Society

Finlay Photograph by Edwin L. Wisherd

THE RECEIVING LINE OUTSIDE THE WORLD'S LARGEST SOUP KITCHEN AT CAMDEN

While hothouses and transplanting have extended the tomato canning season, most of the crop is rushed into cans in about six weeks. Then Camden's big soup plants work day and night. Overhead looms the Delaware River Suspension Bridge, linking Philadelphia and Camden.



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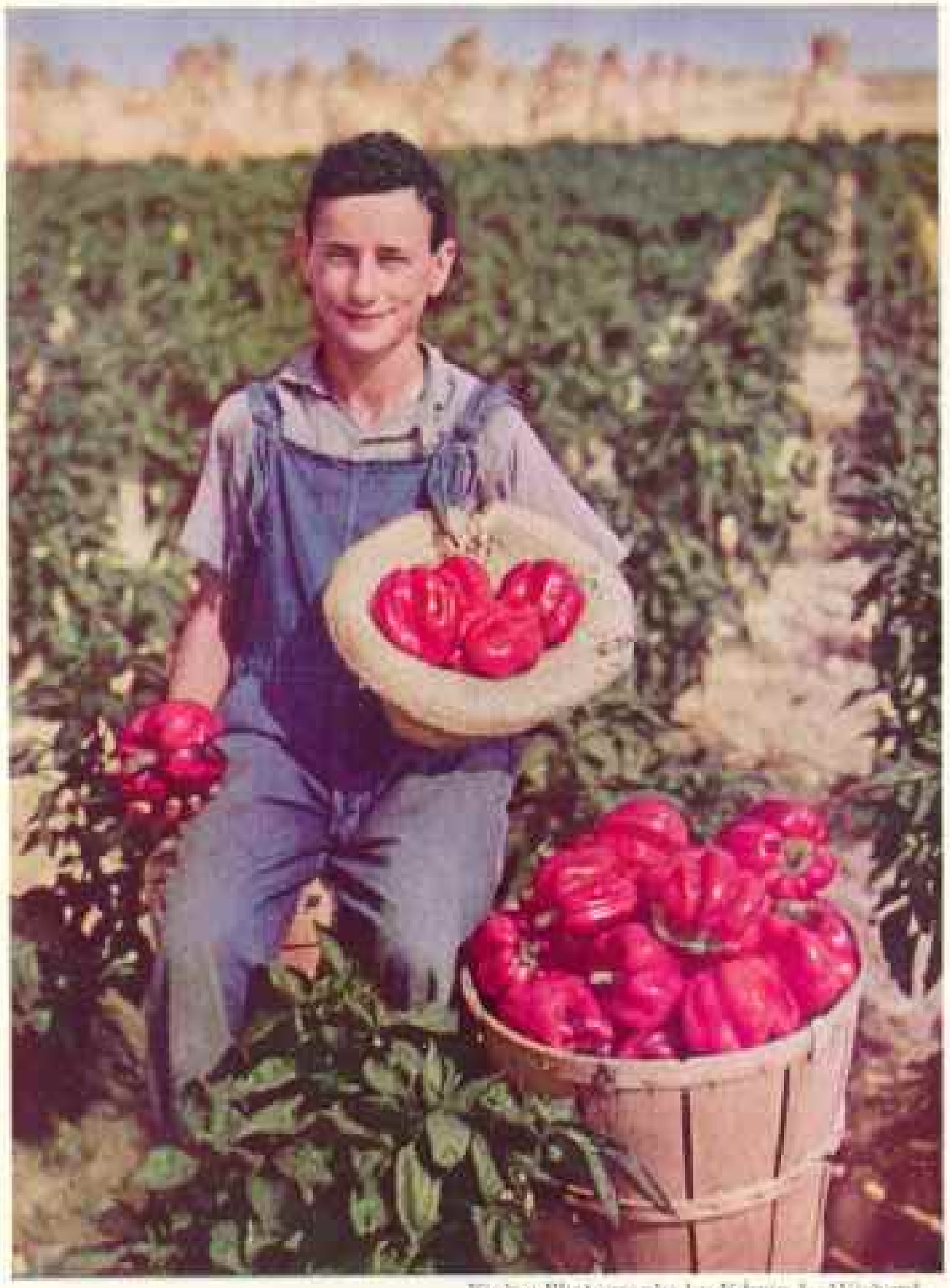
FORE!

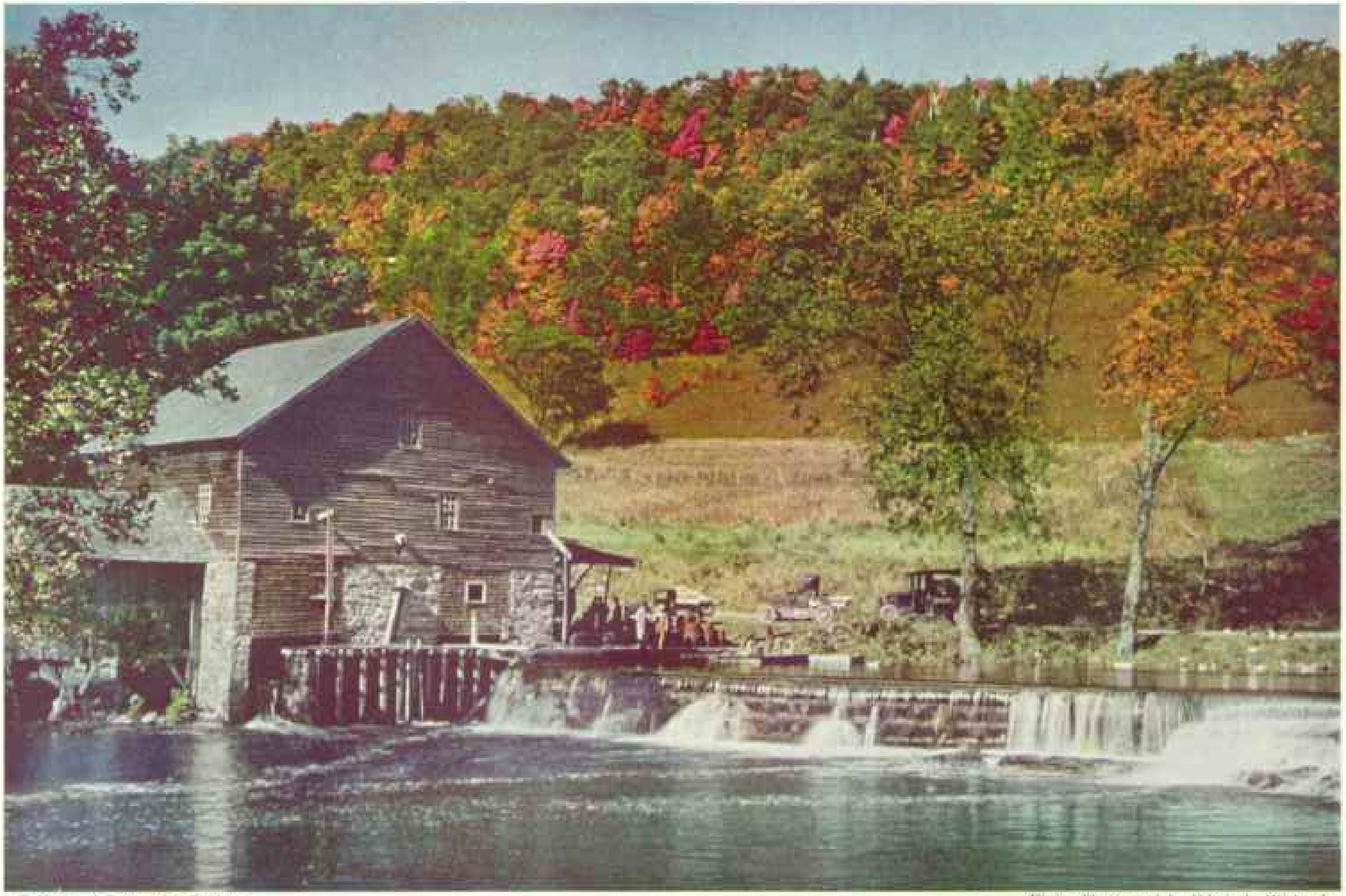
In a State whose highways are traversed by millions of vehicles annually, outdoor advertising must assume bizarre forms to attract attention. By licensing billboards New Jersey has materially decreased their numbers in recent years.



Finlay Photographs by Edwin L. Wisherd

JERSEY FARMING IS "COLORFUL"

Red peppers against a green field and brown corn shocks—a common sight in a State that raises nearly every known farm crop of the Temperate Zone. Sweet potatoes, string beans, onions, asparagus, spinach, lettuce, and beets are other important vegetable crops.



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Finlay Photograph by Edwin L. Wisherd

"DOWN BY THE OLD MILL STREAM," IN SUSSEX COUNTY

This venerable cider mill, on the road between Flatbrookville and Wall Pack Center, draws upon orchards in the Kittatinny Mountain country of northern New Jersey.

© National Geographic Society

Finlay Photograph by Edwin L. Wisherd

THE PALISADES, A RAMPART OF VOLCANIC ROCK ALONG THE HUDSON

Since 1900 New York and New Jersey have cooperated in the preservation of this beautiful scenic spectacle. The motor roadway climbs from a picnic grove and yacht basin to the summit of the Palisades, near Englewood.

© National Geographic Society

DYED LEATHER, NOT SILK

Newark draws upon domestic and foreign markets for its third most important industry. Some hides, such as the top one in this picture, imported from Germany, contain over ninety square feet of leather.

Finlay Photographs by Edwin L. Wisherd

FOR BOOKS, SHOES, AUTOS, CHAIRS

In the manufacture of high-grade automobile upholstering, Newark leads the world. Its leather industry also makes book covers, furniture, pocketbooks, and shoes from cattle, kangaroo, alligator, and walrus hides.

© National Geographic Society

A NICE POLKA DOT TIE, SIR?

Paterson owes its preëminence as a silk-manufacturing center to the Passaic River, which provides both water power and water chemically suited to silk-dyeing. One is seldom out of hearing of clicking looms in "The Silk City."

Finlay Photographs by Edwin L. Wisherd

BRIGHTENING THE PANTRY SHELF

In this Millville glass factory the operator is dusting mineral paint on each jar by hand. The paint will later be baked into the glass. Southern New Jersey's glass industry, using native quartz sand, also makes test tubes, window glass, flasks, and bottles.

TRENTON IS AMERICA'S CERAMIC CAPITAL

Among the fine tableware sets made in the potteries of Trenton are those used in the White House at Washington; in the presidential palace in Havana, Cuba; and in several American embassies and legations abroad. The best chinaware is decorated by artists who command higher fees than are paid to many portrait painters.

© National Geographic Society Finlay Photographs by Edwin L. Wisherd

NERVE FIBERS OF COMMUNICATION

In the telephone equipment plant at Kearny, near Newark, cable for the underground circuits of New York and other large cities is woven. This cable contains 2424 insulated wires, yet it is only two and five-eighths inches in diameter.

Out of a Trenton factory, on huge wooden spools higher than a man, came the wire for several of the world's longest and most famous suspension bridges, including the George Washington Bridge and the Bear Mountain Bridge, over the Hudson; the Brooklyn, Williamsburg, and Manhattan bridges over the East River, and hundreds of smaller spans in this country and abroad.

Last November a large Havana company, manufacturing several of the aristocrats of cigardom, moved its plant from the Cuban capital to Trenton.

Here is a splendid State Museum of Natural History. Its exhibits reveal the natural resources, wild life, geology and archeology of New Jersey, and it also lends exhibits, slides, movies, and lecturers to the public schools.

This institution gives special programs for parents. While coöperating in the Americanization of New Jersey's foreign-born, who comprise a fifth of the total population, the museum recognizes that many who came from overseas brought with them unique costumes and customs of universal interest, worthy of perpetuation. A series of exhibits of the costumes, furniture, utensils, and decorative arts of foreign countries attracted crowds to the museum last year (see illustration, page 570).

In Princeton and Rutgers New Jersey possesses two of the original nine colonial colleges, and in Stevens one of our foremost technical schools.

PRINCETON UNIVERSITY RESEMBLES OXFORD

Oldest and most noted of all New Jersey schools is Princeton. How much it resembles Oxford! Its lacy Gothic spires, ivy-clad stone buildings, lush green grass, and overarching trees, seen across the early morning meadows, vividly recall the old English university city.*

Like Oxford, Princeton is situated in pleasant, rolling farmland, near centers of population, but far enough removed from them to be free of their distracting influences upon student life.

"Princeton," as a name for the University, is comparatively young. It was "The College of New Jersey" until 1896, when the present title was adopted. In a humble parsonage in Elizabeth the first students of "New Jersey" gathered for lectures in 1746. A year later the college moved to Newark and, after Nassau Hall had been built, in 1756, to Princeton, then a country village. Its 900-acre campus to-day contains 75 buildings (see illustrations, pages 555 and 557).

The new Chapel, a magnificent example of late Medieval Gothic, has several of the finest stained-glass windows in America, all of American workmanship and of American glass. Above man-made Lake Carnegie rises Palmer Stadium, where the Tiger roars defiance to friendly enemies of the gridiron. Down a shady lane, side by side, are Princeton's substitutes for fraternities, the Clubs.

NASSAU HALL ONCE A "CAPITOL" OF THE NATION

While town and gown are inextricably mixed in Princeton, the community has its own traditions, whose roots go far back into colonial days. During the Revolution Nassau Hall served as hospital and barracks alternately for American and British troops. When the Continental Congress fled from Philadelphia to escape the first "bonus army" of Continental veterans in 1783, Nassau Hall became the "capitol" of the infant nation.

To-day this historic structure is the administration building of the University. The room where Congress and the Legislature sat is open to the public, and one may stroll through its oak pews, gaze at the collection of fine old paintings hung along its walls, including the Peale portrait of Washington, and muse on the stirring scenes that have taken place in this venerable chamber.

Clothed in ivy and shaded by giant elms, Nassau Hall is the living, breathing symbol of the University.

Not far from Princeton, in the western corner of Monmouth County, lies a rich dairying region known as the "Cream Ridge" district. Plainsboro has one of the Nation's largest dairies.

Near Princeton, too, is the recently restored colonial inn at Rocky Hill, where George Washington prepared his farewell address to the Continental Army, and Flemington, where handicraft pottery has been made for more than a century.

One of the world's busiest trade arteries stretches like a broad belt across the

* See "Oxford, Mother of Anglo-Saxon Learning," by E. John Long, in the NATIONAL GEOGRAPHIC MAGAZINE for November, 1929.

Photograph by H. Armstrong Roberts

LANDING THE CATCH IN A SMOTHER OF SPRAY AND FOAM

Utmost skill is required to ride a heavily laden boat through the surf. In the foreground a helper holds the tackle which hauls the vessel up on the sand. This photograph was taken at Ship Bottom, on Long Beach.

Photograph by H. Armstrong Roberts

A TAPE AND A WITNESS WILL PROVE HIS TALE

The two large fish are channel bass; the smaller one is a weakfish. In summer "Fishermen's Specials" are run to shore resorts for deep-sea fishing. These excursions leave the cities at early hours, when only an angler would arise, and return late the same day.

Photograph by Edwin L. Wisherd

"HARD APORT! BREAKERS AHEAD!"

It's fun to play helmsman in your own backyard. This weather-beaten, solid mahogany wheel from a sailing ship represents a mystery of the sea. It was washed up on the beach near Barnegat Light (see Color Plate I) shortly after the World War.

Photograph by Oscar R. Applegate

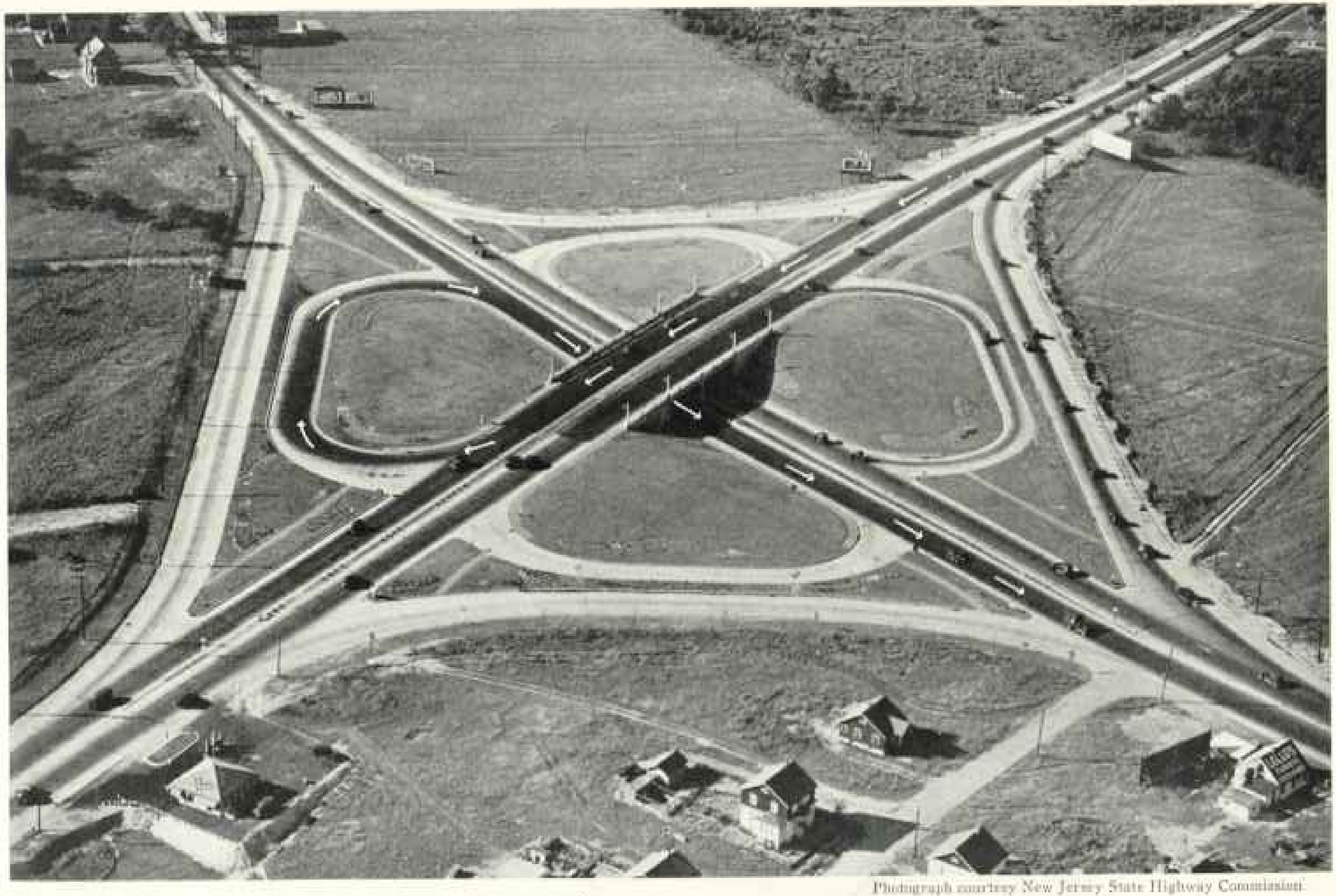
A BIT OF YUGOSLAVIA IN TRENTON

A Homelands Exhibit, to which immigrants loaned many heirlooms, was sponsored by the State Museum. Illustrations from the NATIONAL GEOGRAPHIC MAGAZINE were used in designing the booths, such as this one showing a kitchen of the Southern Slav peoples.

Photograph by Edwin L. Wisherd

A REMINDER OF THE DAYS OF WILLIAM PENN

The office of the "West New Jersey Proprietors" in Burlington. With the similar building owned by "East New Jersey Proprietors" in Perth Amboy, it enjoys the distinction of being a direct link with the government of colonial times in America (see text, page 558).



Photograph courtesy New Jersey State Highway Commission

AT A "CLOVER LEAF" YOU MUST TURN RIGHT TO GO LEFT

This ingenious method of handling heavy traffic, where two trunk roads intersect near Woodbridge, permits the free flow of cars at all times. The arrows indicate the course to be followed by a motorist from New York on his way to the seashore. On his return he will follow the outside lane to the right.

Photograph by Edwin L. Wisherd

BROAD STREET IS THE BROADWAY OF NEWARK

New skyscrapers overshadow the spire of old Trinity. A city of many factories, the Jersey metropolis also is noted for its industrial and art museums, and for a Public Library that has pioneered in many ways of extending its service (see text, page 574).

"waist" of New Jersey between the Delaware, at Trenton, and the Metropolitan district, at the head of Newark Bay. All but one of the major land trade routes from New York City to the south and west cross New Jersey (see map, page 521).

It is but a matter of minutes for an airplane to hurdle this historic land bridge, and it is only from the air that one may obtain a coherent picture of its transportation lines, industrial sites, and closely crowded towns.

Converging air lines from the south and west pick up our route at New Brunswick, with a busy factory making surgical dressings and antiseptic cotton, and the campus of Rutgers University, overlooking the "banks of the old Raritan." Follow the silver ribbon of the Raritan northwestward and there is dusty Manville, the largest asbestos-products center in the country, and Somerville, surrounded by handsome suburban homes.

In rapid review pass Plainfield, city of motor trucks and printing presses, and Menlo Park, where Edison produced the first incandescent electric light. Your eyes will have to be sharp to see the simple stone that marks the site of the latter. All the remaining old buildings of the establishment were moved several years ago to Dearborn, Michigan, where they have been restored as a part of Henry Ford's early American "Greenfield Village."

Where the long arm of Raritan Bay tapers into the Raritan River rises the city of Perth Amboy. The old red-brick executive mansion where William Franklin, son of Benjamin Franklin, served as the last royal governor of the Colony of New

© Aero Service Corporation

THE DELAWARE—AS IT MAY HAVE LOOKED WHEN WASHINGTON CROSSED IT

The modern bridge marks the route of General Washington and his 2,400 Colonials over the ice-choked torrent on Christmas night, 1776. Boats were hidden back of the island just above the bridge, on the Pennsylvania side. Both banks in the vicinity of the historic crossing are preserved as State parks.

Jersey, stands on the top of a hill overlooking Raritan Bay.

As the plane rushes northward Elizabeth, the city of sewing machines (see illustration, page 525), and the copper refineries along Arthur Kill (which separates New Jersey from Staten Island) come into view.

The great arch of Bayonne Bridge, longest steel-arch bridge in the world, rises like a giant bow from the waters of Kill van Kull. Two other mighty spans, the Goethals and the Outerbridge Crossing, return traffic from Staten Island to the Jersey side.

Off to the right, on a long peninsula that separates New York Bay from Newark Bay, giant mushrooms seem to have sprouted from the ground. These are oil tanks of the important refineries of Bayonne (see illustration, page 580). A New Jersey refining company, oddly enough in a State which has no oil fields, is the largest firm of its kind in the United States and the second largest in the world.

THE WORLD'S BUSIEST AIRPORT

Finally the plane circles a broad patch of level ground nearly surrounded by hangars and other buildings. This section of the once useless Meadows west of Newark Bay was a swamp five years ago. Opened to air traffic in September, 1930, Newark Airport has risen steadily until to-day it is the world's busiest airport. Six transport companies and two local air lines scheduled a total of 89 planes daily in and out of Newark during 1932, and in addition a constant stream of unscheduled

Photograph by Edwin L. Wisherd

THE LAST WORKSHOP OF A FAMOUS INVENTOR

Thomas A. Edison did have a desk—this old-fashioned one in his study at West Orange—though he spent most of his time in laboratories. His associates say the clock stopped three minutes after his death, and the hands were tacked to the dial as they stood.

private and military planes used this municipal field (see Color Plate IV).

Just as it is difficult to place a finger on the most definite characteristic of New Jersey, so it is hard to determine the flavor of Newark, its chief city, with a population of nearly a half million. Newark to-day is in a state of flux, but the changes that are taking place point to a vast metropolitan center.

Newark, since the World War, has changed amazingly. New high buildings have cut through its skyline; in them one finds the clerical forces of many firms whose office address is New York.

And again Newark has become a seaport. Whalers once sailed up to the city docks on the Passaic River, but when ships of deeper draft began to carry world trade Newark had to be content with lighters and small coastwise vessels. Now Port Newark, a municipal development on the upper part of Newark Bay, has again brought ocean-going vessels to the gates of the city.

Only Newark itself can list all the thousands of different products which pour out of its factories. The most important in order of production value are: electrical machinery and supplies; paints and varnishes, leather, meats, foundry and machine-shop products, chemicals, and jewelry.

Here are some old trades, as well as highly specialized industries. Electrical instruments are made with counterbalancing pointers that are miracles of craftsmanship. One of these has an arm of aluminum tubing with walls one-ten-thousandth of an inch thick, and balance threads (for tiny brass nuts) are cut 500 to the inch. This work must be done under a magnifying glass.

In Newark, too, many of the world's largest air-conditioning plants are designed and constructed. That which safeguards valuable photographic plates in the new Washington headquarters of the National Geographic Society was built here.

Newark Library to-day is the largest in the State, and one of the Nation's finest. Libraries throughout the United States and in many foreign countries have

adopted methods originating in this Newark institution.

Only London has a larger coördinated bus and trolley system than one Newark company, which serves 421 New Jersey municipalities, reaching all but one county in the State. In 1931 it transported a total of nearly 400,000,000 passengers, the equivalent of more than three times the population of the United States.

Strangers are confused by the interlocking huddle of municipalities around Newark. Essex County is really one city with nearly a million people. Once isolated villages have expanded so rapidly that outsiders cannot tell where one ends and another begins.

Bloomfield offers an example of an intensely diversified community in a State noted for variety. With a population of only 38,000, many of them commuters, it embraces some forty industries, large and small, which run the gamut from safety pins and horse-radish to books, electric lights, and woolens.

Courtesy Westinghouse Lamp Co.

A "MOVIE" THAT MAKES MOVIES POSSIBLE

On a ground-glass screen are projected images, magnified 100 times, of the tiny coils which will be filaments in lamps for homes, streets, motion-picture projectors, and studio lights. The rapid succession of images is halted only when the quick eye of the inspector detects a flaw.

In a Bloomfield lamp works were made the bulbs that shine from the Statue of Liberty, and those that illuminate the Washington Monument, Holland Tunnels, Natural Bridge, Virginia, and the Bermuda Caves. Here is made every type of lamp, from the "grain of wheat" used by dentists and physicians, to the giant bulb for movie and outdoor illumination.

Although we may not realize it when we pay a small coin for an electric-light bulb, we are purchasing a commodity that requires more delicate craftsmanship than anything else sold in bulk. The tungsten filament is one of the finest-drawn commercial wires, pulled through a diamond die to a thickness of 0.0004 of an inch. Compared to a lamp filament, a human hair resembles a piece of heavy rope. It is all part of the day's work in this Bloomfield factory to deal with argon, helium, and neon, an atmospheric pressure of 0.00001 per cent, and pressures up to 25 tons per square inch! With pardonable pride this plant adopts the slogan used by the United States Engineers in France: "It can't be done—but here it is!"

Photograph by C. E. Engelbrecht

BOBBING TARGETS DEMAND A QUICK EYE AND STEADY ARM

Visitors at Lake Mohawk engage in a novel archery tournament. When the supply of arrows fails, the fair marksmen take to canoes to recapture them. Though the State is fringed with salt-water resorts, more than a score of lakes in the hills of northern New Jersey are centers of summer homes and vacation camps.

Photograph courtesy New Jersey State Highway Commission

SIX TRUNK HIGHWAYS CONVERGE ON THE GEORGE WASHINGTON BRIDGE

Elevated roads and underpasses permit a flow of traffic that is never checked. In one place there are three levels of roadway. Suburban communities in northern New Jersey have developed since the completion of the world's longest suspension bridge, across the Hudson River, which links Bergen County with upper Manhattan Island (see text, page 583).

© Aero Service Corporation

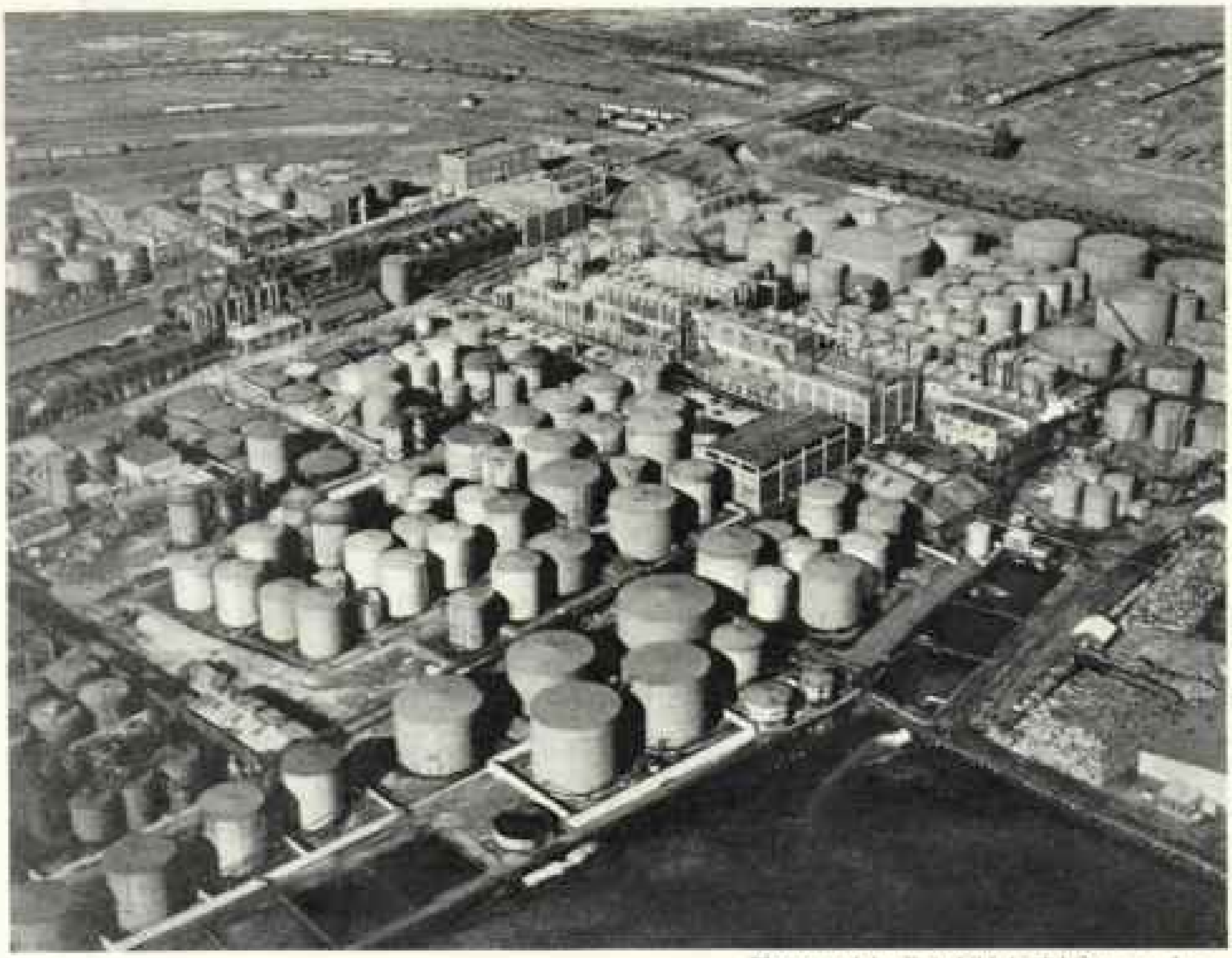
LAKE HOPATCONG, A COBALT JEWEL IN AN EMERALD SETTING

New Jersey's largest lake, whose Indian name means "Honey Water of Many Coves," has a shore line of more than 40 miles. Part of the area in the foreground has been made a State park.

Photograph by Fairchild Aerial Surveys, Inc.

A VIADUCT THAT HURDLES TWO RIVERS AND A DOZEN ROADS AND RAILWAYS

Once the "Jersey Meadows" at the head of Newark Bay caused vexing delays to motor travel. Now through traffic from the Holland Tunnels to Newark and Elizabeth may speed over a high-level viaduct three miles long, the largest structure of its kind. The river in the middle distance is the Hackensack, with Jersey City, the Hudson River, and the skyscrapers of New York in the distance (see map, page 529).



Photograph by Fairchild Aerial Surveys, Inc.

FROM THE AIR OIL TANKS RESEMBLE MUSHROOMS

This Jersey City refinery is typical of many situated along the New Jersey side of New York Bay and along Newark Bay. Bayonne, south of Jersey City, is the world's foremost oil-refining center.

In an unpretentious red-brick building that faces on one of the principal streets of West Orange an empty chair sits before an old-fashioned roll-top desk. Here Thomas A. Edison spent the last years of his life. His library and study have been maintained just as he left them (see illustration, page 574).

JERSEY CITY A FOCUS OF INDUSTRY AND TRAFFIC

Jersey City, largest of the Hudson River cities opposite New York, has industries ranging from soap to printing and type-making. Oddly enough, it is one of Jersey's "least-known" cities to outsiders. Railroads skirt its business district or pass through it underground, while the main motor highway to the Holland Tunnels runs in a subsurface roadway through the residential districts.

Many American doughboys recall the Jersey side of the Hudson, a major embarking and disembarking point during the World War. "Where do we go from here, boys, where do we go from here? Anywhere from Harlem to a Jersey City pier," ran the words of a popular war song.

To-day Jersey City handles most of the freight-car traffic that comes into the Port of New York from the south and west. One of its printing plants turns out tons of telephone directories annually for New York, Philadelphia, Baltimore, Washington, and other large eastern cities. In the same plant lithographing for several widely circulated magazines is also prepared.

A museum attached to a Jersey City type-manufacturing concern contains a copy of the rare Canon Missal, dating from 1458, one of the first books printed entirely on a press, and many tiny "thumb-nail" books, exquisite examples of craftsmanship. Modern type faces are measured for accuracy to one-ten-thousandth of an inch, the thickness of a cigarette paper.

Photograph by Fairchild Aerial Surveys, Inc.

OIL REFINERIES LOOK LIKE SKELETONS OF SOME PREHISTORIC MONSTER

This maze of tubes, tanks, and chimneys marks the Bayway refinery near Elizabeth. The bends in the pipes (left foreground) allow for heat expansion. Petroleum is brought in by tank steamers, tank cars, and pipe lines, some of the latter extending more than 1,700 miles from oil fields in Kansas, Oklahoma, and Texas.

From Jersey City northward along the Hudson to Weehawken is one of the highest concentrations of railroad traffic in the world. New Jersey leads the Nation in railroad trackage per square mile, and the focus of its busiest lines is this short bit of territory along the Hudson opposite Manhattan Island.

Freight-car contents are transferred here into the holds of liners, and recently a terminal was established which places loaded cars themselves within huge vessels called "seatrains." *

THE "BIG PUSH" OF COMMUTERS AT HOBOKEN

More interesting than the manner in which commodities are transshipped from rails to boats, however, are the split-second schedules devised for the waves of commuters that sweep twice daily through the half-dozen terminals on the New Jersey side of the Hudson. It is estimated that 2,000,000 people pour into and out of Manhattan on a typical business day, and that more than 15 per cent of them arrive from New Jersey.

Come with me into the Hoboken terminal tower of the Lackawanna and watch the "big push" of commuters homeward-bound. No major offensive of the World War was timed to a greater nicety than this daily event which has become as much a part of the commuter's life as his meals and sleep. Crowded ferryboats and tube trains from Manhattan have brought armies of men and women to the train shed, where long expresses are waiting to hurry them to scores of suburban stations.

"Zero Hour" comes from 5:25 to 5:35 p. m., when every commuter wants an

* See "Louisiana, Land of Perpetual Romance," by Ralph A. Graves, in the NATIONAL GEOGRAPHIC MAGAZINE for April, 1930.

Photograph by Edwin L. Wisherd

SHREWSBURY'S "VINEGAR BIBLE"

Instead of St. Luke's "Parable of the Vineyard," this rare volume, owned by the congregation of Christ Church, in Shrewsbury, has a "Parable of the Vinegar." Printed in Oxford, England, about 1717, only a half dozen copies of the edition containing this printer's error are known to exist. There is an old saying among printers that "Not even a copy of the Bible has ever been printed without a typographical error."

express that will get him home about 6 o'clock. Commuting railroads perform the seemingly impossible by sending several trains to the same destination at almost the same time, one making stops that another skips. Newark, a metropolis of 442,000, may not be even a flag-stop on an express hurrying through-passengers on to Millburn or Morristown.

EARLY TRANSPORTATION HISTORY MADE AT HOBOKEN

Once these suburban stations were dreary places, the butt of cartoonist jokes; but railroads found that handsome station buildings and platforms, landscaped grounds around them, and rights of way free of unsightly dumps are good business. Not only do they foster commuter pride, but they also set good examples to communities in gardening.

Continuing up the Hudson through the pier district of Hoboken, we come suddenly upon a little grassy knoll, the campus of Stevens Institute of Technology. It is fitting that this noted college of engineering should have a commanding location overlooking the skyscrapers of Manhattan, because here Col. John Stevens conducted many of his early and prophetic engineering experiments. Later inventors have dimmed somewhat the glory of the Stevens family, but to John Stevens and to his sons, Robert L. Stevens and Edwin A. Stevens, America is indebted for much of the development of the transportation industry both on land and on water.

Here, at Castle Point, as the knoll is called, Col. John Stevens built the first condensing, double-acting steam engine designed in America, and installed it in a boat on the Hudson three years before Fulton's *Clermont* took the water. As early as 1825 Colonel Stevens experimented with the first locomotive in America to run under steam on a track. A circular line was built near the Stevens home, and visitors were whizzed around at the then phenomenal speed of 12 miles an hour!

His sons continued the development of steam navigation and railroad transportation, and in 1867 the will of Edwin A.

Stevens provided for the establishment of the college which bears the Stevens name. Stevens Institute of Technology to-day has a campus of 30 acres in the City of Hoboken and an Engineering Camp at Johnsonburg, New Jersey, of 375 acres.

Greek, the traditional academic bugbear of our forefathers, must seem child's play to Stevens graduates who have mastered "chemical thermodynamics," "Newtonian potential function," "vector calculus," and "operational circuit analysis." Yet it is from similar esoterics that great bridges such as the George Washington Bridge, lofty skyscrapers like the Empire State Building, and deep tubes such as the Holland Tunnels are evolved.

The New Jersey end of the George Washington Bridge, a few miles farther up the Hudson, is a good starting place for a loop around the scenic northern part of the State. We thread our way first through the maze of underpasses, overpasses, "clover leaves," and one-way roads (see illustration, page 577) that separates traffic at this busy junction point. Off to the right runs a boulevard that clings to the crest of the Palisades, affording magnificent vistas of the Hudson and the hills of New York's Westchester County beyond (see Color Plate XIII).

PATERSON'S SITE CHOSEN FOR A PURPOSE

Our route strikes westward through Bergen County and Passaic, the city of woolens; thence to Paterson, "the Silk City," and home of Garret A. Hobart, the twenty-fourth Vice-President of the United States.

The site of Paterson, like that of Washington, D. C., was chosen deliberately for a purpose.

While the falls of the Passaic River at this point had a part in the selection of the site, Paterson was to be a home for Alexander Hamilton's "Society for Establishing Useful Manufactures."

Major L'Enfant, the French engineer who designed the plan of the National Capital, was asked to chart its power canals, mills, and residential districts.

Hamilton's dream, however, never came true. The cotton industry died. In 1853 an Englishman discovered that the waters of the Passaic River were chemically ideal for silk dyeing. From this time dates Paterson's fame and wealth as a silk weaving, dyeing, and finishing center (see Color Plate XV).

The airplane age brought another type of manufacturing to Paterson. The largest single industry in Paterson to-day is the aëronautical motor factory where the rotary engine used by Col. Charles A. Lindbergh in the *Spirit of St. Louis* was made. Admiral Byrd, on his flights to the North Pole and to France; Clarence Chamberlin, Sir Hubert Wilkins, Frank Hawkes, and others have used or are using its motors.

The fireproof chamber used to test these superengines is a terrifying but fascinating place. Each motor is mounted on a block, a propeller is attached, and then the engine is run full speed for six hours without stopping. The din is terrific, and gazing through the thick glass of an observation window, one may see the throbbing engine, and jagged red flames spouting from short exhaust pipes.

This ordeal is only part of a program to maintain a standard of workmanship and safety. Record-breaking flights and other brilliant aërial achievements would not be possible if the living heart of planes were not subjected to such severe trials.

Once clear of the industrial districts and commuting suburbs of Paterson and lower Passaic County, our highway climbs into a region of fresh green hills, dotted here and there with sparkling jewels of water. This region was scarred by glaciers, and many of the lakes fill pockmarks left by grinding ice ages ago.

Uphill and down we roll on a flawless road to Franklin, center of one of the country's biggest zinc-mining operations, and to Hamburg, with an old gristmill and a reproduction of Hänsel and Gretel's Gingerbread Castle (see page 553).

Long before we reach Sussex it is evident that this town must be a dairy center. Nearly every hillside has its herd of Jerseys, Guernseys, and Holsteins.

The country grows steadily wilder as we climb to High Point Park. With its continuation, Stokes Forest, this reservation is the most spectacular of all New Jersey recreation areas.

Frenchtown and Belvidere, on the charming upper reaches of the Delaware, are shopping centers for many week-end campers. This region, too, is a fly-fishermen's paradise, and the State has established a hatchery at Hackettstown. Phillipsburg makes pneumatic drills that have dug foundations for skyscrapers and burrowed the earth for tunnels and mines.

Photograph from Aero Service Corporation

MAJESTIC DELAWARE WATER GAP

The Delaware River carved this S-shaped breach in the forest-clad Kittatinny Mountains. The aerial view from the Pennsylvania side shows the Shawnee Golf Course in the foreground.

Historic Morristown, surrounded by manorial estates of the wealthy, reveres the tree-shaded headquarters used by Washington in the winter of 1779-80. Congress recently authorized establishment of Morristown National Historical Park to preserve this old colonial home and its grounds.

But there are other interesting things to see in Morristown—including the old iron works where Stephen Vail and S. F. B. Morse secretly perfected the telegraph.

Morristown has, too, a school where German shepherd dogs are trained to lead the blind. These dogs are to the sightless what crutches are to the cripple.

Passing through Madison, "The Rose City," with its glistening hothouses, we follow a highway along the crest of the Watchung Mountains, pausing a moment for a bird's-eye view of the maze of communities that stretch from Eagle Rock to the man-made peaks of Manhattan.

Finally we reach Caldwell, birthplace of Grover Cleveland, the only native son of New Jersey to achieve the Presidency. New Jersey sent Woodrow Wilson to Washington, but he was born in Virginia.

Scores of other places—historic, industrial, agricultural, scenic, and educational—crowd to mind. Like Walt Whitman, Jersey's adopted son, I should like to "sing of cities invincible," and of the destiny New Jersey is carving for herself.

But New Jersey needs no prophet. Her future is secure.

FLYING

By Gilbert Grosvenor

President of the National Geographic Society

PRESIDENT and Mrs. Roosevelt like air travel. It will be remembered that they flew together from Albany to Chicago, when the President was nominated, to make his speech of acceptance before the Democratic Convention.

What a change since the President's mother, Mrs. James Roosevelt, as a girl of eight, sailed with her mother, Mrs. Delano, in a clipper ship from New York to China, a voyage around Cape Horn that lasted four months!

Lewis and Clark, with a modern plane, could have made their two-year trip from St. Louis to Oregon and back *in two days!*

How air speed thus wipes out time and distance is common knowledge. We all know that men, mail, and express fairly whiz through the air day and night. We hear the planes roar overhead; but since they touch earth only here and there, at airports outside the cities, not all of us realize the swift, huge growth of air traffic. Official figures are almost incredible.

To-day air mail carried is five times what it was six years ago. The number of air passengers has multiplied 62 times, and express carried is 35 times what it was in 1927.

Not only is all America served, from Alaska to Argentina, but all Europe likewise has its net of air lines, with long-distance routes stretching from London to South Africa and India, from Marseille to Indochina, and from the Netherlands, about 8,200 miles, to Netherland India—to say nothing of the airship *Graf Zeppelin* making scheduled round trips between Germany and Brazil.

It took nearly three centuries to cover our country with roads and tracks on the ground. In little more than a decade some 28,000 miles of airways have been plotted and largely marked along their routes with lights and signs.

For use of the 7,136 licensed civilian planes and 18,539 pilots that fly these elevated railways of the sky, more than 2,100 airports and landing fields now dot the United States. Some are lonely desert stations at emergency landing fields; others, owned by cities or private concerns, are commodious and ornate.

The latest airway map of the United States shows 35 scheduled airway companies. Many routes parallel the railways. Some take bold short cuts. Some are transcontinental; others run north and south, as from Seattle to San Diego, or Chicago and New York to Miami (p. 634).

On our domestic routes and connecting foreign lines, planes are flying about 150,000 miles a day. Two-fifths of this travel is at night. For the past few months, despite hard times, about 42 per cent of all passenger seats have been sold.

It cost an air passenger about 15 cents a mile to ride in 1929. Since then fares have been steadily reduced. Now the rate throughout the United States averages about the same as first-class train fare plus Pullman charge.

TRAVEL BY AIR GROWS IN POPULAR FAVOR

Less than 20 years ago air-passenger service was unknown. A pioneer flying boat carried sight-seers on scheduled trips over the 17 miles between Tampa and St. Petersburg, Florida, for a few weeks early in 1914. So far as Federal records show, that was America's first regular air-travel line.

Last year scheduled air lines in the United States carried more than half a million paying passengers. About 1,500,000 more flew on sight-seeing trips over cities, in private planes, and on other non-scheduled flights.

Though each year sees more traffic by air, the rapid increase in passenger travel is of most significance. It proves that the public's former lack of full confidence in airplanes is disappearing.

Many ride the air, of course, for the sheer pleasure of flying and the scenic delights that are afforded by a transcontinental voyage, or by such a trip as that over the Florida Keys, along the Grand Canyon, or from Los Angeles to Portland.

But it is no longer the mere novelty and thrill of flying which sells most air tickets. Among the commuters who habitually ride the express planes between such busy airports as Washington and Newark, Kansas City and Chicago, or San Francisco and Los Angeles, there are naturally some

Photograph from Wide World

FRANKLIN D. ROOSEVELT, AS PRESIDENT-ELECT, ABOUT TO BOARD AN AIRPLANE

With Mrs. Roosevelt and his son, Elliott, the Governor of New York left Albany by plane for Chicago, to receive formal notification of his nomination for the Presidency.

"joy-flying fans," newlyweds, schoolgirl vacationists, and leisurely sight-seers. But a count of noses shows that most air travelers to-day are bent on business; they are doctors, lawyers, bankers, editors, merchants, engineers, salesmen—in fact, the same classes who ride the railway trains.

One instance serves to show how business men are using air service advantageously. An official of a Toledo corporation recently made a seven-day air trip to Chicago, Cheyenne, Denver, Salt Lake City, Los Angeles, San Francisco, Portland, Seattle, Vancouver, British Columbia, and return. At some of these points his local agents met him at airports for conferences between planes. The surface journey would have taken 13 days longer.

Work as you fly is the rule of Will Rogers, Senator McAdoo, Ramsay MacDonald, and other busy executives. Most planes are equipped with table, typewriter, and compartments for reference papers and books. Parts of this article were written in a Curtiss Condor plane between Miami and Washington.

Tourist flyers are also increasing. To Havana, Nassau, and the West Indies alone go more than 1,500 passengers a week. Fifty per cent of these are women; about 3 per cent are children in age anywhere from a week old to 12 years, when they pay full fare.

NO AGE LIMIT

Nor is there any apparent age limit. One recent 79-year-old passenger on a trip around South America, William H. Gannett, of Augusta, Maine, has more than 100,000 air miles to his credit.

A married couple, 76-78 years, were passengers over the Andes. A baby girl, flying to Rio de Janeiro from Miami, had spent much of her 72 days of life in the air.

One recent coast-to-coast passenger carried by United Air Lines was a six-weeks-old boy. He flew from Seattle to New York in 31 hours and seemed to enjoy his

Courtesy Eastern Air Transport

MRS. FRANKLIN D. ROOSEVELT AND A FLYING HOSTESS

On the fast planes of the Eastern Air Transport line between Washington and New York, her former home, the President's wife is a frequent passenger. She often knits as she flies.

sky ride. When another infant was being flown east from Los Angeles, the pilot kindly sent radio calls to stations ahead to have special baby food ready when the plane halted.

A recent check of United Air Lines passengers shows that 60 per cent were officers of corporations, 20 per cent were sales officials, engineers, and other representatives of corporations, and the rest miscellaneous travelers. This seems to indicate that business men have turned to the airplane because it speeds up transaction of affairs and conserves time and money. Sixty per cent of 784 corporations, each capitalized at $100,000 or more, have executives and representatives using airplanes regularly, according to a survey of these companies.

Members of the staff of the NATIONAL GEOGRAPHIC MAGAZINE have totaled 50,000 miles of air travel during the past year. They have saved time and expense by so doing.

Speed, beyond any doubt, is man's chief reason for riding in airplanes. In pioneer days the bullwhacker goaded his ox team to gain another half mile per hour; stage drivers lashed their galloping four-horse teams and changed to fresh horses every few miles. With steam came competition among parallel railways, to cut out grades, curves, and all possible stops, to gain more speed. The same race for speed is apparent now among competing air lines.

AIR SPEED INCREASES

From a cruising rate of 75 miles an hour we have seen planes become faster and faster; some now average 150 and more miles per hour, depending on winds. Today you can fly the 200 miles between Washington and Newark airport (for New York City) in 80 minutes; from San Francisco to Los Angeles, 348 miles, in one hour and 58 minutes.

Between New York and Los Angeles the air-passenger schedule is less than 25 hours eastbound and 20 hours westbound, as compared with three days and eleven hours by rail. New planes carrying mail

Photograph from Ewing Galloway

A HOSTESS ON DUTY IN THE AIR

Most crews of large air-liners now include a hostess, who serves lunch and tea, provides pillows and blankets, and answers numerous questions.

and express parcels may cut these times nearly in half within twelve months.

With more speed, bigger and better planes bring more comfort. Divested of all circus thrills, to-day's efficient machines, reliable pilots, and the businesslike methods of highly organized air transport companies make flight across the continent no longer a novelty. Planes run on time cards like trains.

Symptoms of nervousness, once seen among passengers as planes took off or landed, have about disappeared. So says the "flying hostess" who serves your lunch as you fly, brings you chewing gum and ear cotton, something to read, or tilts back your chair, turns out your lamp, and pats your pillow for you when night comes.

The flying hostess is credited with having done much to increase the number of women air passengers. One of these young ladies, a former New York school teacher, has flown—on duty—a distance of more than 150,000 miles. The total number flown by 12 hostesses on one line in the past two years amounts to more than 1,500,000 miles. The dean of flying hostesses has covered 278,000 miles! The popularity of this new vocation for women is shown by the 15,000 applications for such jobs, so far received by one company.

"Passengers take air travel for granted now," said one hostess. "They ask fewer questions; some seldom even look out the windows."

LETTERS RIDE THE SKIES FASTER

Man first sought to send mail by air in 1870, when beleaguered Paris cast balloons adrift in the wind carrying letters to the outside world. One balloon carried 500 pounds of letters. This service, of course, depended much on chance. Mail was just as likely to land in enemy territory as among neutrals. Some of these balloons were never heard of again.

In 1911 experiments with mail-carrying planes were made in India and England. In September of that year, on Long Island, New York, America's first official trials were also made. Earle L. Ovington, with his *Queen* monoplane, was named air-mail

Photograph by Ewing Galloway

AËRIAL PASSENGER TRAFFIC DEFIES THE DEPRESSION

A trimotor passenger plane awaits travelers at the American Airways station at Newark. This terminus accommodates most of the lines carrying passengers to and from New York's metropolitan district, which includes Newark, Jersey City, and other near-by places. One air line flies shuttle planes between New York and Washington every hour; frequently the traffic requires two planes for a scheduled run.

© International News

JUST IN TIME TO CATCH THE SKY-LAND EXPRESS!

Two modern voyagers consult the bulletin board at a Pan American Airways terminal, Miami, Florida, for information about the arrival and departure of the more than 100 large passenger ships of the air operating between the United States, Central and South America.

carrier and covered a regular route between Mineola and the flying field, only ten miles away. He carried many thousands of letters and post cards during this week's experiment.

It was not until 1918, however, that money granted by Congress was actually used to set up an experimental air-mail route between New York and Washington.

Yet, since 1926, air mail has increased by more than 1,500 per cent.

It was 433,649 pounds then. In 1931 it had reached a total of 9,643,211 pounds. It declined slightly in 1932 because of higher air-postage rates and hard times.

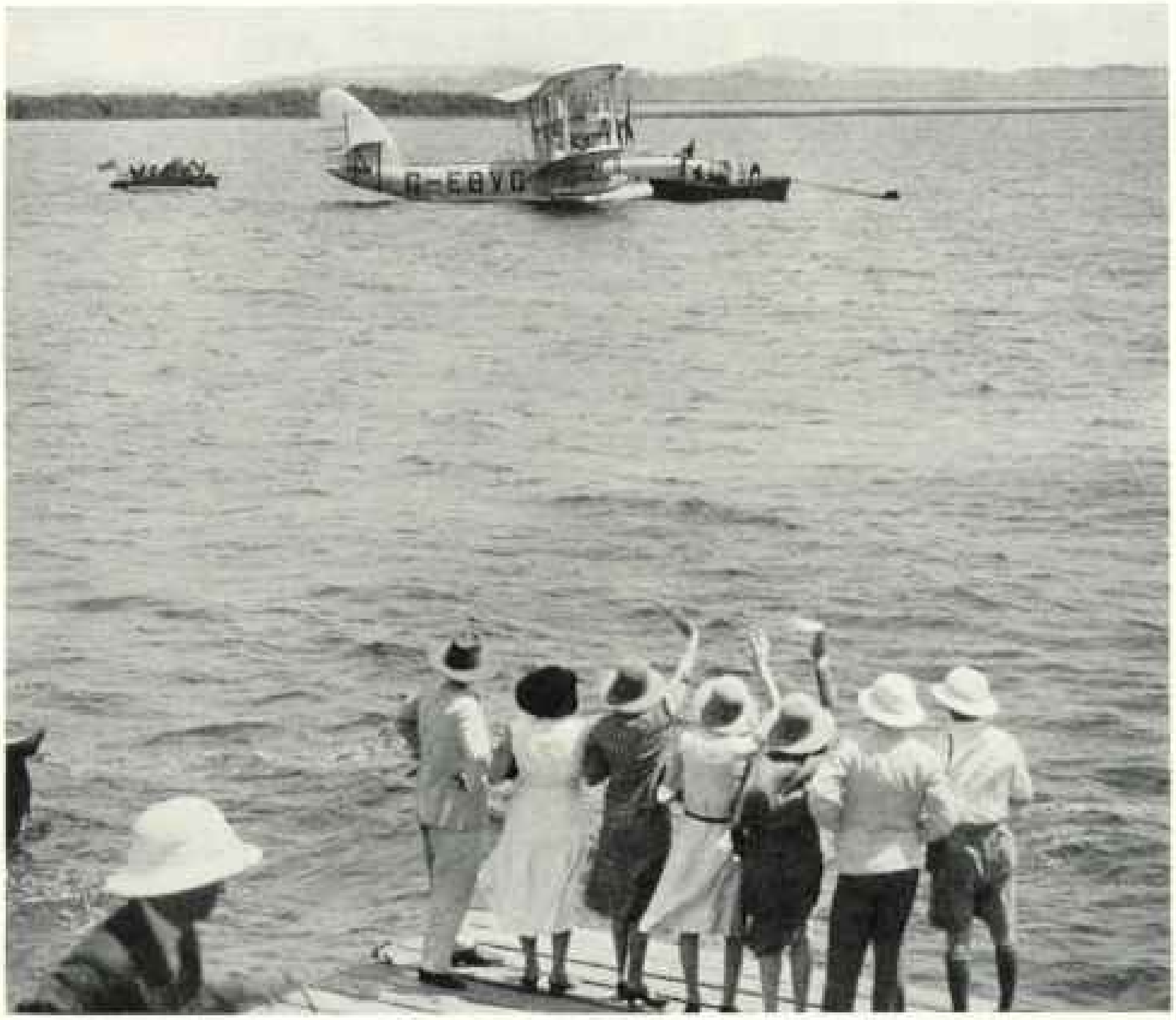
Out of every dollar the Post Office spends, only 2.1 cents goes for air mail, paid for by the mile. More than half that is regained from the postage.

Last year the public bought more than $10,000,000 worth of air stamps, besides using many ordinary postage stamps, marking the letters "by air mail."

AIR-MAIL COST DECREASING

The cost per mile flown on air-mail routes has been steadily decreasing. In September, 1931, the cost per mile averaged 67 cents. In the same month of 1932 the cost had decreased to 58 cents a mile. When these figures are considered, along with the total miles flown by air-mail carriers over their lines with and without mail, the present rate is about 55 cents per mile, and is expected to drop to 50 cents a mile this year.

Mal B. Freeburg, who flies for the Northwest Airways, Inc., is the first air pilot to be honored with the Mail Flyers' Medal of Honor, recently authorized by Congress for heroism or extraordinary achievement.



Photograph from Ewing Galloway

A SEAPLANE ARRIVING AT PORT BELL, LAKE VICTORIA, AFRICA

Imperial Airways, Ltd., of Great Britain, provides service on regular schedule over the following routes: London-Paris, London-Zürich, and London-Brussels-Cologne, as well as over its important Empire routes: London-Delhi (India), to be extended to Australia in 1933 and eventually to China and Japan; London-Cairo, and London-Capetown, down through Africa. This company is cooperating with Pan American Airways and with French air-transport interests to develop an air line between Europe and North America.

On April 12, 1932, Pilot Freeburg, with Copilot Joe Kimm, departed from St. Paul, Minnesota, for Chicago. The plane carried six men and two women passengers, in addition to a load of mail.

Flying at about 2,000 feet in ideal weather, Freeburg suddenly experienced a terrific jolt. He cut the switch just as one motor broke loose from its moorings. Not knowing for a moment what its effect would be on the other motors, the pilot cut all the switches.

Then he found that the fallen motor had lodged on the left landing gear struts. Again Freeburg switched on the other two motors and still had an altitude of about 1,800 feet.

His next thought was to get rid of the loose motor; but, as he was flying over a thickly settled farming district, he was apprehensive that it might fall on a house.

So he pointed his ship over the Mississippi River and maneuvered his plane so that the useless motor fell off on an island he had picked out! He then turned the plane around and flew back to Wabasha emergency landing field.

Damage to the landing wheel was such that it would not turn, and its tire was cut open. Yet he made a safe landing.

Already he had radioed the flying headquarters at St. Paul about the accident. A relief plane was dispatched to Wabasha, where the passengers and mail

Photograph by Fairchild Aerial Surveys

AMERICA'S LEADING AIR TRANSPORT CENTER, NEWARK AIRPORT

In 1932 about 100,000 air passengers and some 2,000,000 pounds of mail were cleared through this busy terminal. In the right background is seen the graceful Bayonne Bridge, connecting the city of Bayonne with Staten Island.

AND NOW THE "TRAFFIC COP" OF THE AIRWAYS!

With this light the operator can flash a beam of red or green for several miles, indicating to the pilot whether the way is clear, either for landing or for taking off.

© International News

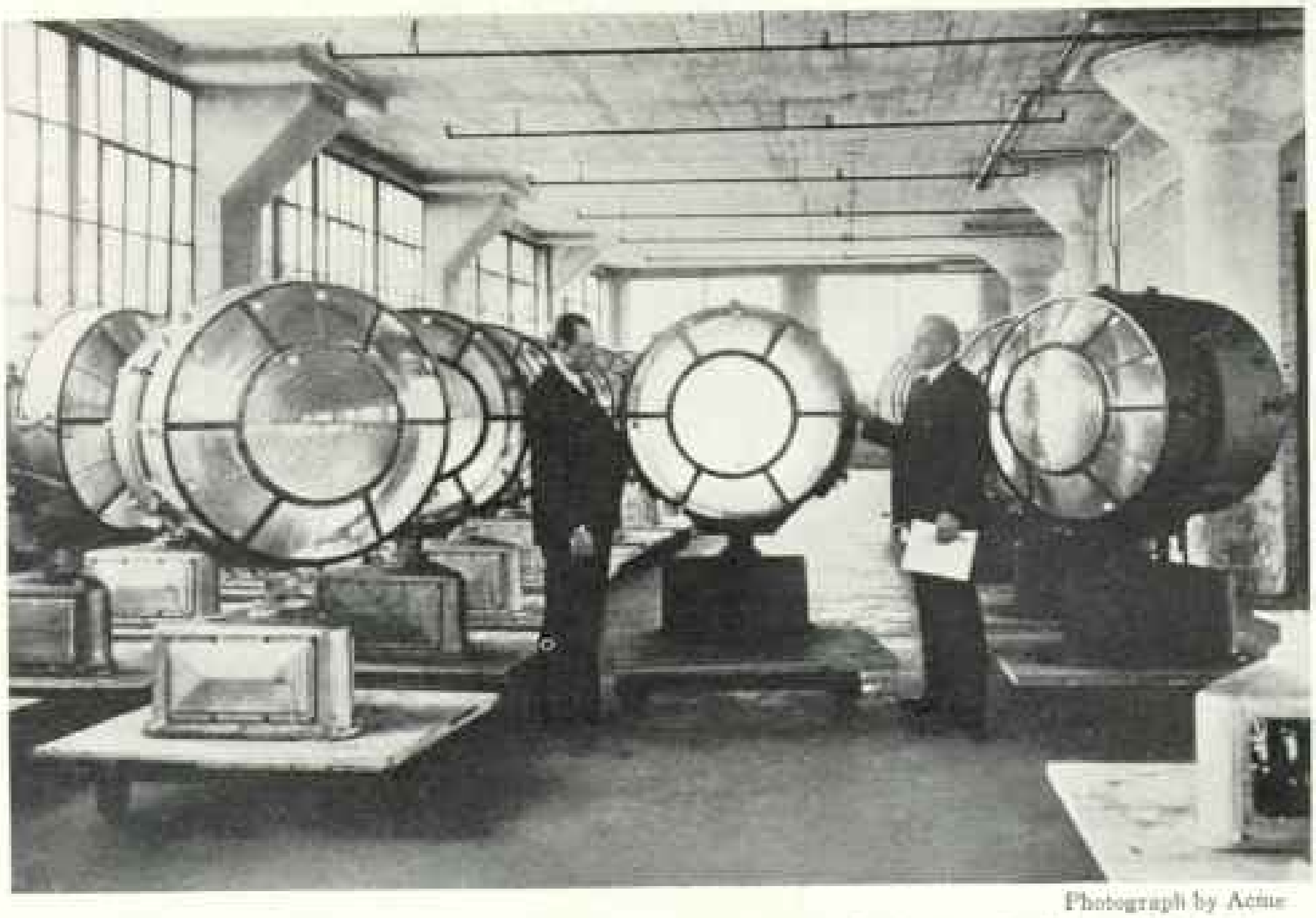
AN 82-YEAR-OLD PASSENGER ARRIVES FOR A BIRTHDAY PARTY

Declaring that "air travel is the most interesting way of going from one end of the country to the other," this enthusiast flew to Newark Airport from her home in Los Angeles to attend the birthday party given by her son.

Photograph by Burton Holmes from Galloway

ALHAMBRA AIRPORT, A FLYING FIELD FOR LOS ANGELES AND VICINITY

Like the long-familiar "railroad crossing" signs, warnings against airplanes in motion and propellers revolving on planes at rest are now erected about many airports.



Photograph by Acme

POWERFUL BEACON LIGHTS AID NIGHT FLYING ON FEDERAL-LIGHTED AIR LINES

These are the world's strongest airway lamps, a double beam of about 1,780,000 candle-power being thrown from each end of the beacon, which revolves three times a minute instead of the usual six. They are visible in clear weather at 50 miles. If a lamp should fail, a new one is immediately inserted, automatically, by a clever lamp-changing device.

Courtesy Eastern Air Transport

THE PILOT'S CABIN OF A CURTISS CONDOR PASSENGER PLANE

At the panel's top, nearest the pilot's eye, are these flying instruments: horizon, compass, directional gyro, altimeter, air-speed, bank-and-turn, and rate-of-climb indicators. At left, Howard C. Stark, famous for his development of instrument flying.

were transferred, and the trip was continued to Chicago.

One of the significant features of this occurrence is that during all this trouble Freeburg was talking into his radio phone, advising St. Paul of what was happening—while it was happening—and explaining what he was attempting to do.

AIR TRAFFIC WITH LATIN AMERICA

Air-mail service to Latin America is a good example of what planes now achieve. To-day a letter by air can go from New York to Buenos Aires, be answered, and that answer got back to New York in about the time boat mail takes merely to sail from New York to Argentina.

New York mail to Puerto Rico, in the West Indies, flies there in 24 hours and less. That is 2,650 air-line miles, or 50 miles farther than from New York to Los Angeles.

Seas are wide, jungles are thick, and mountains are high along the far-flung

Photograph from Acme

PASSENGERS DINING ON A NEW GIANT GERMAN PLANE

An interior view of a Junkers trimotor 20-passenger ship now flying on the Luft Hansa Line between Berlin and Amsterdam. Meals are served upon commodious tables. This plane is named for Capt. Hermann Kohl, German transatlantic flyer.

Pan American Airways routes. For years travel between the Americas and around South America was costly and tedious for those who made these trips to promote our commerce with these Latin lands.

Even when Pan American Airways began its little 110-mile air line from Key West to Havana, making the trip in one hour instead of six by boat, passengers were few and far between. Air rides were still thought a bit adventurous.

That was only five years ago. Since then, in our air traffic with Latin America, planes have flown more than 51,000,000 miles and thousands of passengers have patronized the air lines that now link us with 31 countries in the Western Hemisphere.

The airplane has been the means of hurdling in one swift jump all the geographic and climatic difficulties which heretofore handicapped inter-American travel. Mexico City is within five hours of our border; Havana and Nassau within one and two hours; Jamaica and Haiti within seven hours; the Panama Canal Zone and every country in the Caribbean area within two days; the most distant capital of South America within seven days.

More than twenty United States firms have contracted with Pan American Airways by the year for carrying their entire field staffs around Latin America. This works both ways. Five South American countries report many more of their merchants are coming to the United States now than before air lines were opened. "Nearly 80 per cent of our passengers," says a company official, "are sales executives or sales representatives traveling on commercial missions."

COST COMPARABLE TO STEAMER FARES

With the tremendous savings of time in their favor, air fares have been consistently lowered until to-day they are close to levels of first-class steamer fares.

Pan American's equipment is different from any encountered in the United States. For the most part it is marine craft, big multi-motored flying boats, including three four-engined, 44-passenger

A COMMODORE PASSENGER SEAPLANE TAXIES UP TO THE AIRPORT DOCK AT PORT-AU-PRINCE, HAITI

Seaplanes of this line depart from Puerto Rico in the morning, stop to refuel at Port-au-Prince and Nuevitas, on the north coast of Cuba, and reach Miami, 1,200 miles distant, in the evening.

Photographs by Clifton Adams

BAGGAGE OF AIR PASSENGERS BEING PASSED BY HAITIAN CUSTOMS INSPECTORS

These Caribbean seaplanes also haul much express, sometimes including such odd items as live chicks, anteaters, honey bears, monkeys, birds, dogs, and cats (see text, page 616).

"Clipper Ships." The Clippers are the most comfortable and luxurious flying sea craft in daily use (see pages 629, 638).

Whether it is diphtheria antitoxin for some remote mining camp, serum to combat meningitis in Central America, or doctors and nurses needed where an earthquake has struck, planes serve now as speedy relief agents.

Only one day after the earthquake in Nicaragua, seven planes of the Pan American Airways arrived there from Miami, Cristóbal, and Mexico City with doctors, nurses, medicine, and food supplies.

Then there was Belize, in British Honduras, struck by the worst hurricane in its history. Just before the storm a radio operator, noticing the barometer's sudden drop, spread the alarm. Hardly had he flashed the news to Miami when the hurricane hit Belize and destroyed it. Later the operator got Miami and told his tragic story. Soon a relief plane roared over Belize; it could not land, but it dropped medical supplies to the shattered city.

GIVING WINGS TO ERRANDS OF MERCY

Barely had the quakes ceased in Los Angeles and Long Beach before anxious relatives in New York and Boston were flying westward to the stricken cities.

No longer do shipwrecked sailors adrift at sea watch only for "a sail." Now help may come from up in the air. Ten men drifted helplessly in an open boat, miles from shore, in the Caribbean. A seaplane pilot passing overhead saw them, but could not come down because he had 22 passengers. However, he sent a radio message to the mainland which brought a rescue party.

Not a day passes now that the airplane, together with its ally the radio, does not play some part in the exciting drama of distress and delivery.

Snowbound in the mountains north of Las Vegas, New Mexico, eight miners, a woman, and a small child faced starvation. So deep was the snow that no one on the ground could get through to them in time to save their lives.

But for plucky Army pilots, Lieutenants J. A. Miller and C. J. Brockliss, who flew over the miners' camp and dropped food from a Curtiss Condor bomber, the storm-bound party would have perished. The food was packed in securely wrapped burlap bags, each weighing 100 pounds. Five such bags of food were fastened to the bomb shackles at March Field, Riverside, California, and flown east to New Mexico—away back into the hills, far from lighted airways and landing fields—and then released, right over the starving miners, and dropped just as bombs are dropped.

BANKS SAVE TIME AND INTEREST CHARGES BY USING AIR TRANSPORT

To many of us not in the business, a bank is a place to deposit money or cash a check. We may not stop to think how much banks traffic one with another, sending documents and money from city to city, even across the seas.

To move such cash and securities, banks now make increasing use of air mail and air express.

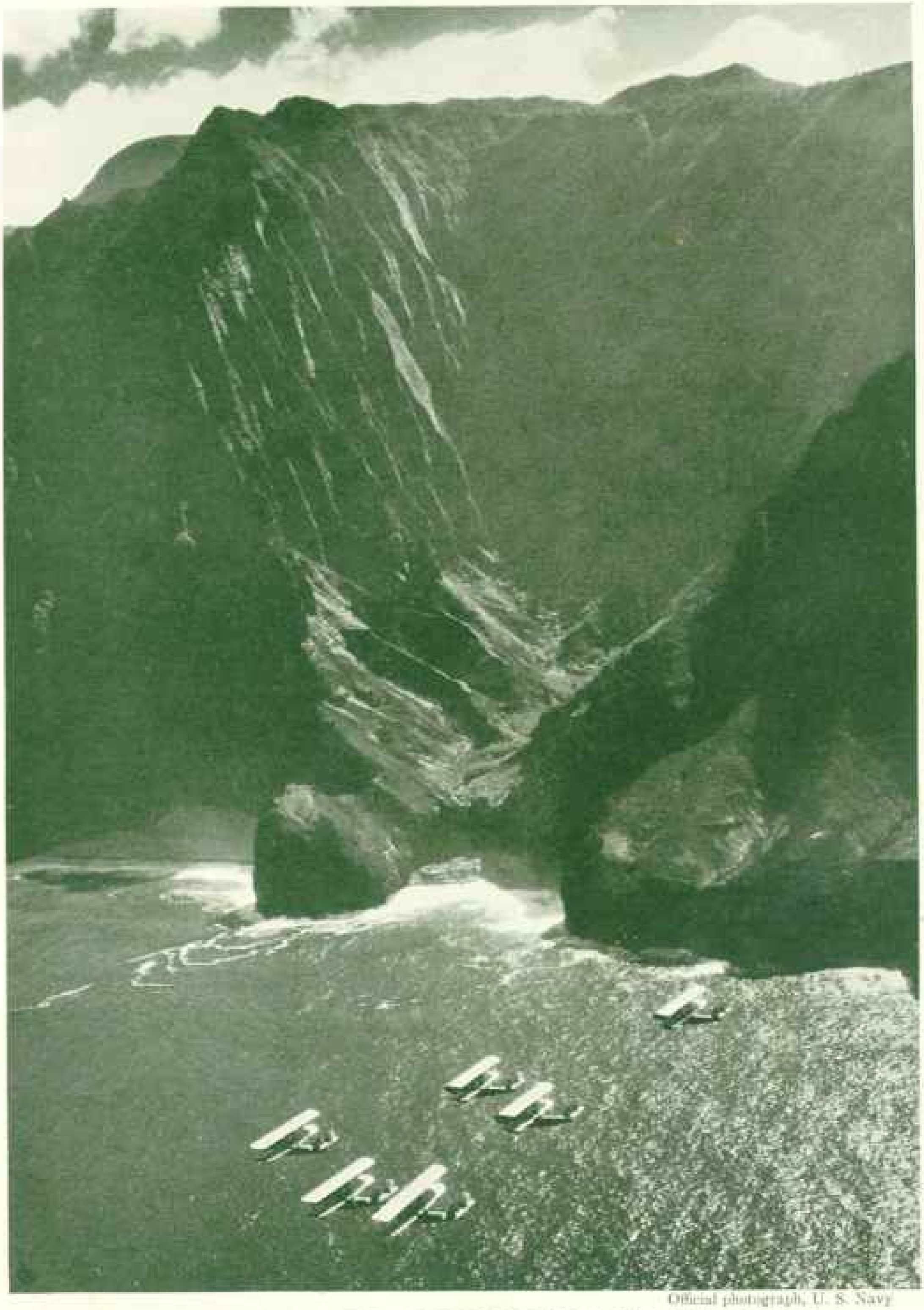
In Latin America especially, where rail and steamer routes may be indirect or connections infrequent, air service is a godsend to commerce. Millions in cash and bullion, bonds, and other valuable documents are carried by Pan American Airways. Here a new form of negotiable paper, the "air draft," originating in Argentina, has come into popular use.

In the United States the use of air transport by banks and bond houses is a matter of daily routine. In 1931 alone, it is estimated that about seven billion dollars' worth of financial paper was flown into New York.

"When Secretary of War George H. Dern was Governor of Utah last year," says an official of United Air Lines, "that State made a bond issue. The Governor signed it and departed for the Democratic Convention at Chicago. Then it was found that a printer's error had invalidated the whole issue. Another was printed, and rushed from Salt Lake City to Chicago by air. Again the Governor signed the bonds, for delivery to purchasers just before the legal deadline.

"While the incident of these bonds was a bit spectacular, securities worth many times their value fly in and out of Chicago every month."

To save interest by cutting the time it takes to send checks, drafts, and notes for collection and credit; to rush funds to banks or others in need; or to hasten valuable documents that may catch a mail ship about to sail—all these are reasons why banks patronize air lines.



Official photograph, U. S. Navy

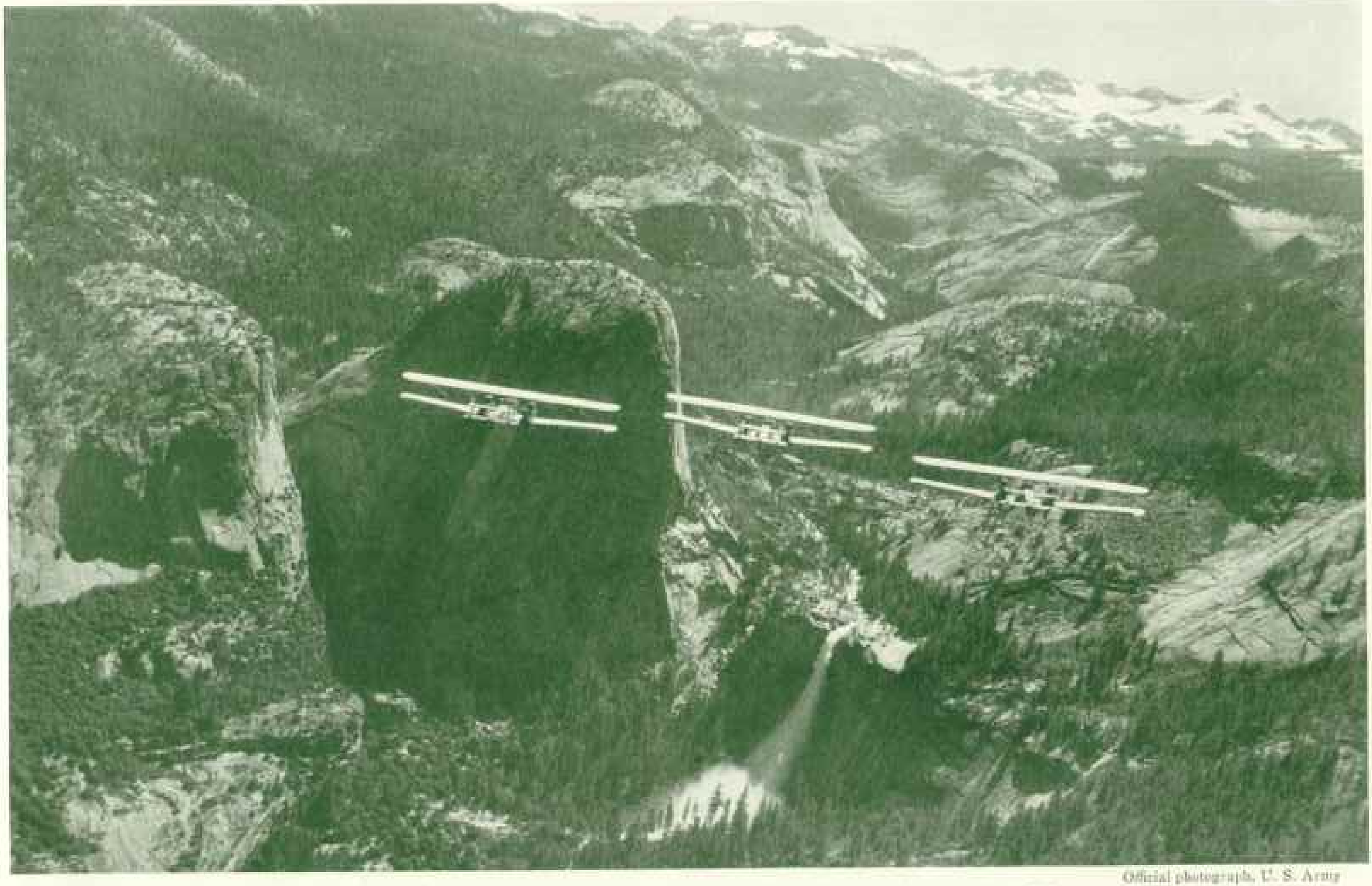
GIANT NAVY PATROL PLANES ARE DWARFED BY KAUAI'S GREEN PALISADES

There are few safe harbors on this breaker-encircled "Garden Isle" of the Territory of Hawaii. Its northern slopes often rise from the water's edge to more than 3,500 feet. Kingsford-Smith, in the *Southern Cross*, commenced the second stage of his first crossing of the Pacific when he hopped from Barking Sands, near here, for the Fiji Islands, in June, 1928.

Official photograph, U. S. Navy

FLYING TOGETHER LIKE HUGE, MIGRATING GEESE, NAVY SEAPLANES FOLLOW KAUAI'S WHITE-FRINGED COAST

At an isolated station in this island on Mount Waialeale there was recorded an average yearly rainfall of 476 inches, or as much as normally falls at Washington, D. C., in eleven years. In the upper part of the picture is a sugar-cane field (right), and to the left is Point Kilauea.



Official photograph, U. S. Army

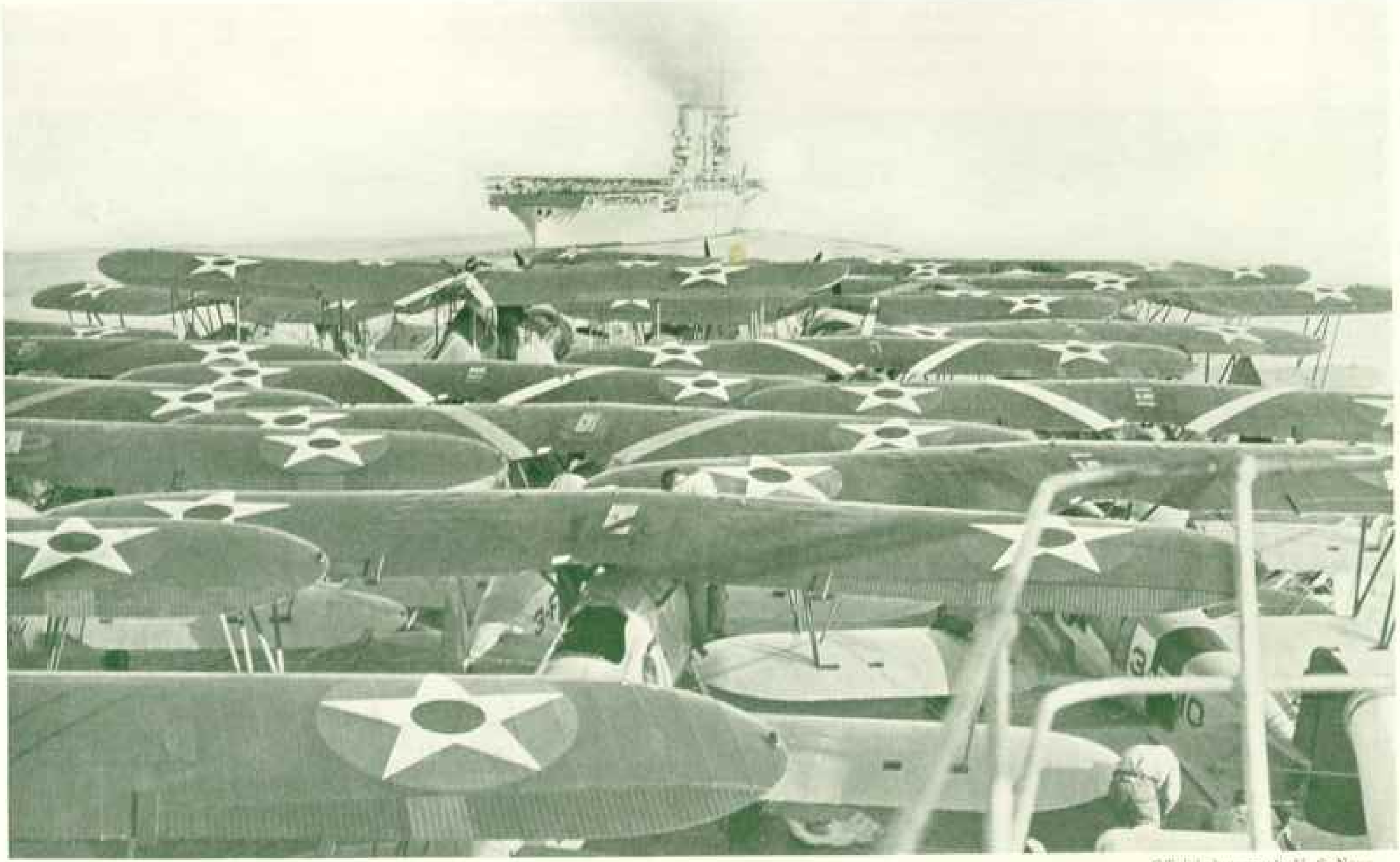
THE GLACIAL CHARACTER OF THE YOSEMITE IS APPARENT FROM ON HIGH

Ground smooth by the action of prehistoric ice sheets, rock faces of the Merced River Valley shine in the sunlight as if freshly polished. Even Liberty Cap, at the left, which towers 1,759 feet above the base of Nevada Falls, shows the effect of Nature's gigantic grindstone. The crest of the Sierra Nevada is in the distance.

Official photograph, U. S. Navy

THE U. S. S. "LEXINGTON" EMERGES FROM HER ENVELOPING SCREEN OF SMOKE

The smoke screen is most successful in comparatively calm weather, for it is soon dissipated by strong winds. The crew has moved all airplanes on the flight deck forward, so that the carrier's brood of fighting planes, scouts, and torpedo planes still in the air may land on her afterdeck. The ship's head is always pointed into the wind when receiving planes.



Official photograph, U. S. Navy

HER AIRPLANES SECURED FOR SEA, U. S. S. "SARATOGA" LEADS THE FLEET SOUTH FOR A CRUISE

Mechanics are always busy tuning and testing motors, to forestall forced landings. Seventy-eight airplanes are carried on each of the large carriers, with repair shops and a complete stock of spare parts. There is an elevator deck for transferring airplanes from the flying deck to the hangar space below. The insignia—red ball and white star in a blue circle on the wings—identifies United States military planes.

Official photograph, U. S. Navy

LIKE A CLOUD OF GIANT MOSQUITOES, NAVY AIRPLANES ROAR ACROSS SAN PEDRO HARBOR

The fog bank, which clings to the Pacific's surface, follows roughly the contours of the coast, but leaves a narrow band of silvery water close to the shore. The mole which extends to the left from Point Fermin protects the harbor.

Official photograph, U. S. Army Air Corps

TO THESE HIGH-FLYING ARMY BOMBERS PIKES PEAK SUGGESTS A SERIES OF GIANT MOLEHILLS

Due to the elevation of the surrounding country and to the many higher mountains in Colorado, Pikes Peak (14,110 feet) is not impressive from the air. The rugged eastern face of the mountain is shown in this view with the white line of the cog railroad climbing up from the lower right. The top of the mountain is the blunt cone on a level with the lower wing of the right airplane. In the far distance is the Continental Divide in the main range of the Rockies.

Official photograph, U. S. Navy

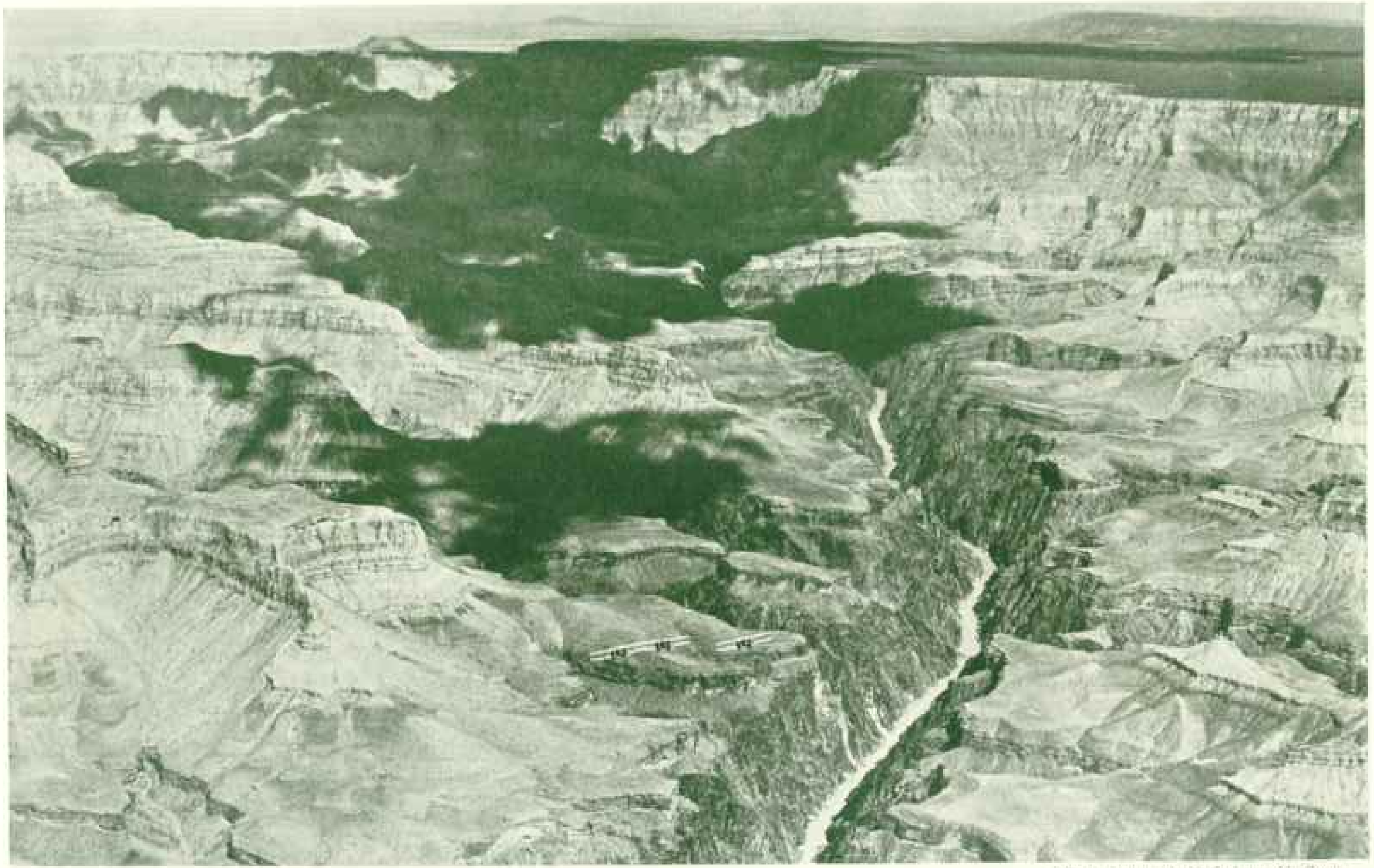
MAN-MADE FOG, NOT THUNDER CLOUDS

During a recent fleet review, Navy airplanes laid a smoke screen. To do this liquid is pumped out of the planes in a steady stream, and when it comes in contact with the air it forms smoke or vapor. Three scouts have taken up the smoke screen where another group of planes left off.

Official photograph, U. S. Navy

NAVY SCOUTS MANEUVER IN PERFECT SQUADRON ECHELON ABOVE THEIR MOTHER SHIP

A forced landing far from the carrier would be serious, for rubber flotation bags, inflated by the pilot after he lands in the water, would keep the plane afloat only a few hours. Two destroyers usually accompany a carrier to aid luckless planes. A battleship is on the horizon.



Official photograph, U. S. Army Air Corps

PARACHUTES WOULD BE OF LITTLE AVAIL IF ENGINES STOPPED IN THE GRAND CANYON

The Army bombers are flying through the deepest part of the canyon. North Rim Lodge, just out of the picture to the left, is more than a mile above the muddy Colorado River. The dark patches are cloud shadows which accentuate the rich red and purple coloring of the canyon. On the horizon is the Painted Desert and beyond the Navajo Indian Reservation.

Official photograph, U. S. Army Air Corps

ARMY BOMBERS PASS IN REVIEW OVER THE NATION'S CAPITAL

Official photograph, U. S. Navy

NAVY AIRMEN MAP THE GLACIERS AND COASTLINE OF ALASKA

Using amphibians, which can alight on sea or land, and aerial cameras, the Navy in recent years has cooperated with the United States Geological Survey in making up-to-date charts and maps of Alaska. The expedition is over Twin Glacier Lake.

Official photograph, U. S. Army Air Corps

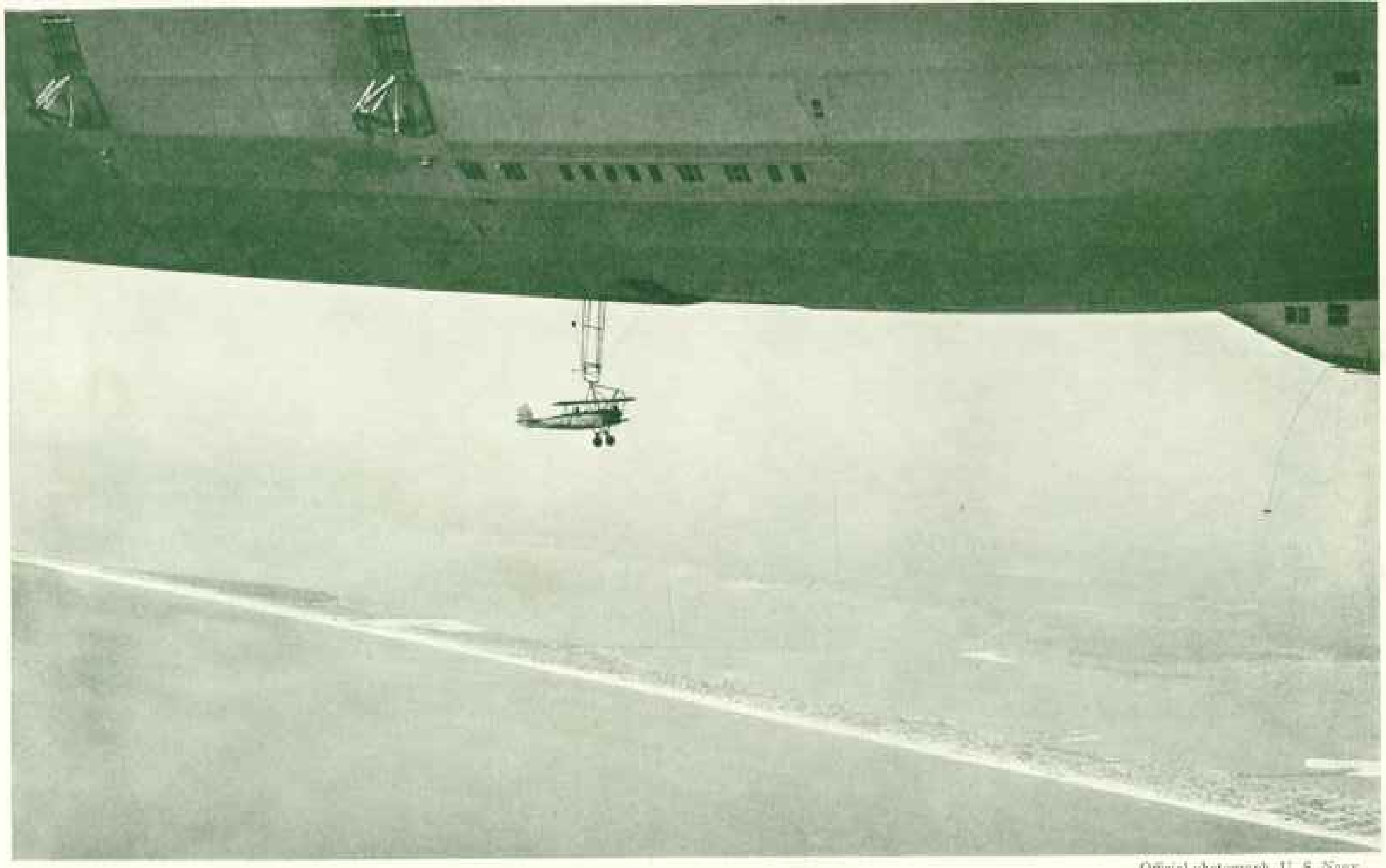
TINY FISHING BOATS RIDING A PACIFIC SWELL LOOK LIKE FLIES ON A CORRUGATED TIN ROOF

As they near shallow water close to the coast of Panama, huge deep-sea waves, relics of a recent storm, are transformed into waves that have crests, but little or no troughs. A light breeze is blowing diagonally across the larger waves to produce a cross-chop. Three Army bombers, escorted by a training ship, are proceeding from Albrook Field, Canal Zone, to David, Panama.

Official photograph, U. S. Army Air Corps

A SQUADRON OF SWIFT OBSERVATION PLANES MANEUVERS OVER GOVERNORS ISLAND AND MANHATTAN

The Hudson River (at left) is dotted with tugs, barges, and ferryboats and lined on both sides with the docks of ocean-going vessels from all parts of the world. To the right of Manhattan is the East River. The Empire State Building, tallest in the world, is dimly visible in the distance beyond New York's financial skyscrapers. A Staten Island ferry streaks off to the left on its way from the Battery.



Official photograph, U. S. Navy

A TRAINING PLANE HOOKS ON TO THE "AKRON" HIGH OVER BAY HEAD, NEW JERSEY

In her airplane compartment this airship had room for five fighting planes, which were hoisted through a T-shaped hatch beneath and hung up like hats on a rack inside. The engines of the *Akron* were within the envelope, as on a surface ship, and drove the outside propellers. The radiators for an apparatus to condense moisture from the exhaust may be seen above the propellers. This photograph was taken near where the airship went down, April 4, 1933.

Official photograph, U. S. Army Air Corps

MOUNT CLEMENS, MICHIGAN, PEEPS THROUGH THE CLOUDS BENEATH A SQUADRON OF PURSUIT SHIPS

Official photograph, U. S. Navy

HEELS OVER HEAD AT THE "PULL OFF"

The officer climbed out on the lower wing to the outer strut and, holding on with one hand, pulled his rip cord. Instantly he was jerked off backward as if by a giant's hand, falling head down. When the parachute has opened fully, his fall will be broken and he will swing back and forth for a time like a pendulum.

"How safe is air transport?" asked bankers when the idea was new. The answer is significant. In all the years of air-mail operation, less air mail has been lost or destroyed than sank with the steamer *Vestris*.

AIRPLANES AND THE GEOGRAPHY OF NEWS

At the climax of the Sino-Japanese conflict in 1932, when Shanghai smoked with battle, airplanes helped serve newspaper readers and theater-goers with pictures of the fighting. When a transpacific liner carrying the first photographs entered the Strait of Juan de Fuca, seaplanes intercepted it to take the pictures and rush them to Seattle, whence other planes flew them to San Francisco, Chicago, and New York.

Aside from printed material, no items appear more often in the air express than do motion-picture newsreels and news photographs. News agencies are among the air lines' best customers, in their keen competition to serve a news-hungry public. Motion pictures and photographs of every newsworthy happening are flown to all important points.

By their very nature, advertising and newspaper services find their fortunes tied up with air transport. News-gatherers were among the first to charter special aircraft in "scooping," and 1932 saw many leading papers using their own planes.

An example of modern speed comes from a Milwaukee newspaper. It sent a plane to get pictures of a distant forest fire. Though caught in smoke and forced to fly low, the photographer worked fast, took in the whole panorama, and sped back to his paper—with 15 minutes to spare from his five-hour time limit.

STRANGE CARGOES RIDE THE AIR EXPRESS

A press of the leading newspaper in Tampico, Mexico, broke down, and the nearest source of replacement parts was Fort Wayne, Indiana.

A 240-pound shipment was rushed to Chicago and placed aboard the "Overnight Flyer" to Texas, and from there by another plane to Tampico. In 48 hours the press was in operation, a delay of a week having been avoided.

It is unlikely that planes may ever compete with ground vehicles in moving ordinary freight.

But light, valuable objects, or perishable things on which shippers can afford to pay an extra price for speed, now go in astonishing variety by air. Here are some strange cargoes that lately rode the planes out West:

Two queen bees were flown from Fresno, California, to Medford, Oregon, via air express. Duck feathers fly from Pasadena, California, to Hartford, Connecticut.

Artificial eyelashes, 8,000 of them, were flown from New York to Los Angeles for the use of movie stars.

Cataract masks used in delicate eye operations were flown from Chicago to Portland, Oregon.

Seventy pounds of sand went by air express from Cheyenne, Wyoming, to Chicago for construction-analysis purposes. Belated accessories for 1933 model automobiles were flown from Detroit to the Midwest and the Far West.

A Denver radio station went off the air with a disabled transmitter, but 12 hours later repair parts reached the Colorado capital from Chicago by air. Famed Olympia oysters, packed in dry ice, land in Chicago, air express, 24 hours from Seattle.

AIR TRANSPORT FINDS MANY USES

Bows and arrows and bridal veils, diamonds, gold bullion and smoke detectors, gardenias and gas guns, even bats and hatching eggs, wing through the air to meet odd whims of a world where time and space yield to man's mechanical genius. The American-owned United Sugar Companies of Mexico used planes to bring insects' eggs from Cuba to Sinaloa in a fight to exterminate another insect that was eating the cane.

Flowers cut in California early in the morning are worn by New York brides and débutantes the following day.

The life of Mrs. William E. Borah, at Boise, Idaho, was threatened with parrot fever; to treat her, serum was rushed by air express from Washington.

Officials of a State fair in Sacramento, California, found at the opening of the exposition that their stock of toy balloons was inadequate. In 19 hours they got a new supply by plane from Chicago.

Some air-line planes carry express in coöperation with the Railway Express Agency's Air Express Division, the pick-up and delivery affiliate of United Air

Photograph by Ewing Galloway

A PLANE DISPATCHER OF THE TRACKLESS SKIES

The operating chief is shown at his control board. By colored electric-light signals, he directs the landing and leaving of all planes at the Grand Central Airport, Glendale, California.

Lines, Western Air Express, National Parks Airways, Northwest Airways, Kohler Aviation Corporation, and Rapid Air Lines. The network of air lines served by this combination totals nearly 12,000 miles; through rail connections, all cities in the country have the advantage of speedy air-express service.

This coördination of air and rail services to reach points not directly on airways has greatly stimulated express commerce. Air-express transport was much coördinated in 1932. Up to that time many lines flew independently, with no provision for the transfer of shipments from one line to another. Then six lines joined in an association known as General Air Express; this now results in service to more than 125 key cities in the Union, and a substantial increase in the volume of goods carried.

One new feature of air express is a door-to-door pickup and delivery service, performed by telegraph messengers. Shippers telephone their calls for a boy; he comes for the package, takes it to the plane, and at destination another boy with a side-car is waiting to make delivery.

Fur coats, jewelry, foodstuffs, racing forms, radio tubes and transformers, paints and lacquers, new styles in clothing and millinery, sea foods, airplane parts, advertising matrices and plates, toys, big machinery parts, electric-light globes, securities and records—these few items serve to illustrate the diversity of air-express shipments.

In one plane from Colombia came macaws, monkeys, and *wasps!*—all to satisfy trade or the curiosity of scientists.

Our flying Clipper ship, sailing above the Caribbean, carried cardboard coops of tiny chicks for Trinidad—thousands of them, each chick in his own little chicken coop. Every time the plane stopped the cabin was filled with the noise of chicken chatter.

AIR EXPRESS SPEEDS FOREIGN TRADE

Returning from the Amazon Valley, one plane brought lizards and tiny tropical fish. No cargo seems too small—or too large.

Pieces of machinery weighing 800 pounds and yeast shipments amounting to nearly a ton rode one plane.

© Planet News, Ltd., from Acme

THE AIR MAIL FROM CAPETOWN, SOUTH AFRICA, ARRIVES AT LONDON

British flyers hold the present records for speed, 407 miles per hour; for altitude, 43,976 feet; and for nonstop, 5,340 miles.

Photograph from Acme

LUNCHEON IS SERVED ALOFT ON A COAST-TO-COAST LINER

Cooking is done in the air on the larger seaplanes. On the land-liners food, already prepared, is taken aboard and kept hot till mealtime. On some lines planes halt for meals.

In New Guinea a British concern moved a whole mining town by air—mills, dredges, supplies, and all.

International air express speeds trade with foreign markets. One company has carried more than 10,000,000 pounds of cargo and mail, with a 99.81 per cent "on time" record. Most of that was routine. In emergencies, such swift, prompt air service is doubly valued.

A cannery in a remote section of Alaska was disabled at the onset of the salmon run. That night a radiogram to San Francisco resulted in a 200-pound part being placed aboard a plane bound for Seattle. It reached there the next morning and was transferred to a waiting steamship. At Juneau the part was put in a plane and hurried to the cannery.

The cost of this emergency shipment was negligible in contrast to the potential loss involved by the inactivity of the canning plant during the peak of the season.

Sending emergency parts for American machinery in South America is frequent. One 356-pound crank shaft flown to Quibdó, Colombia, saved a company 30 days of idleness, at $2,800 per day, that would otherwise have resulted from the breakdown.

In the United States 350 or more private planes are used in business and industry, not only in oil, power, and similar fields, but by insurance companies, publishing houses, and department stores. One wholesale drug firm keeps its plane ready day and night to make emergency deliveries of serums and antitoxins.

MANY NEW DEVICES MAKE FLYING MORE COMFORTABLE

Of the 2,000-odd airports in this country, 619 are commercial. Once, however, when no landing field was available, an enterprising company delivered an order of typewriters by parachute!

What a miraculous change since 200 boy riders—using 500 horses—carried mail before 1840 from New York to New Orleans at the dizzy rate of 14 miles an hour!

Even to our everyday speech, the advent of air traffic has added new words and phrases. We hear of take-offs, hops, riding the beam, low and high ceilings, blind or instrument flying, bailing out, artificial horizons, etc. Such air-travel terms tend to become commonplace, as are other terms used in golf and motoring.

Rapid gain in air traffic, especially during recent years of business retrenching, is much due to many new aids to air navigation which now make flying safer.

Chief among these are lights along the airways; radio-range and radio-marker beacons; the two-way radiotelephones, by which a pilot in the air may talk with airports along his route; and a greatly improved weather-report service, radioed at regular intervals to pilots in the air.

Imagine yourself riding up front with a pilot on a night flight over a modern illuminated airway, and you will understand just how these aids to aërial navigation do their work.

You take off, let us say, from Richmond for Atlanta. As you rise above the lights that flood the field, a clerk sends a message out over teletypewriter circuit which may say:

"Plane GH-4, Pilot Gill at controls, left Richmond at 9 p. m. for Atlanta."

That message, flashed ahead, is automatically written by receiving machines at strategic points along the route you are to fly. By means of it, ground stations on your route can check your progress.

No sooner are you high in air and pointed on your course than you see in the distance a flash of white light. That is your first beacon. People on the ground see it as a revolving searchlight, sweeping a beam low above the horizon six times a minute.

As the light continues to turn and the beam moves to one side, out of line of the pilot's vision, a red light suddenly shows, flashing a dot-dash code signal. That signal tells the pilot exactly where he is; for each beacon has its own identifying dot-dash, and this one indicates that the light you see is the first of ten beacons on the 100-mile stretch of route you are now flying.

When this red code place-signal snaps off, the revolving white light is seen again.

As each red signal-light has its own name in dots and dashes, the pilot has only to refresh his memory by a glance at his strip map for that section of his route.

Flying on over this first light, you may see ahead, if the night is clear, three, four, or perhaps even five more lights. Standing ten miles apart, they illuminate your path like street lamps along a city boulevard.

If the night be so dark that you can see only one light ahead, the pilot, with his

CHRISTMAS ALONG THE AIRWAYS

A ton of holiday air mail and express was loaded into this trimotor plane of the Transcontinental and Western Air for its long trip across the United States. The huge plane, with its three 425-horsepower motors, is seen at the Kansas City Municipal Airport, on its run between Los Angeles and New York. It makes the cross-continent trip, with mail, express, and passengers, in 24 hours (see text, page 587).

switch thrown and his radio-beacon receiver at work, depends on the beacon's aid in steering. Through his ear phones he listens to the signals coming from the beacon transmitter back at Richmond airport.

As long as he sticks straight on his course, all he hears is one long "dash" sound after another; but if he wanders off to one side, he gets "A," or dot-dash in Morse code; if to the other, he gets "N," or dash-dot.

Even if it gets so thick that at times you see no lights ahead, your pilot may follow his true course by flying his plane so that the long-dash sound predominates in his ear phones. Just as a double check, the long dash is interrupted periodically by a "dash-dot-dash" call, which is Richmond airport.

At least every 50 miles along your route you come to a green light. That means an intermediate landing field. But you fly on.

Suddenly the tireless long-dash sound stops in the ear phones and a human voice is heard. It is from a man at the next airport ahead. He states the correct time, what the "ceiling" is, whether it is raining, how hard the wind is blowing, and everything else that will help the pilot to fly in and make a safe landing. The pilot, if he wishes, can talk with this airport ahead, for his radiophone is two-way. He can also talk with other planes. Flying south, a northbound plane passed us—a mile to our left and some 2,000 feet higher. With an extra pair of ear phones, we distinctly heard its pilot conversing with our ship.

Courtesy Eastern Air Transport

IN HELMET, FLYING SUIT, AND PARACHUTE, THIS AIR-MAIL PILOT IS READY TO HOP OFF PROMPTLY ON THE SECOND

United States pilots carried 7,372,220 pounds of mail along 26,893 miles of established air lines in 1932. They flew in all some 33 million miles, for which service the Government paid the mail carriers more than 19 million dollars. Of this sum more than half was regained through the sale of air-mail stamps (see text, page 588).

Photograph by Ewing Galloway

TWO AIR TRAVELERS LAND AT THE FAIRWAY FOR A GAME OF GOLF

Already a few country clubs have landing fields, and the privately owned plane flown for sport is no longer a novelty. Most private planes, however, are used in business or industry—which may range from mineral and timber exploration to high-speed news reporting and making motion-picture thrillers (see text, page 615).

Photograph by Fairchild Aerial Surveys

ON WELL-LAID-OUT RUNWAYS AT THIS KANSAS CITY FIELD TAKE-OFFS AND LANDINGS ARE POSSIBLE IN SIX DIRECTIONS

Photograph by Acme

AN AIRPLANE SERVES AS AN AMBULANCE

This six-passenger plane was used to bring a patient from a small town in Pennsylvania to Philadelphia for an emergency operation. At Central Airport, Camden, a motor ambulance was waiting to take him to the hospital.

Weather news, picked up by observers not only along the route, but at points about 200 miles on both sides, is teletyped to the broadcasting stations and put on the air at regular intervals.

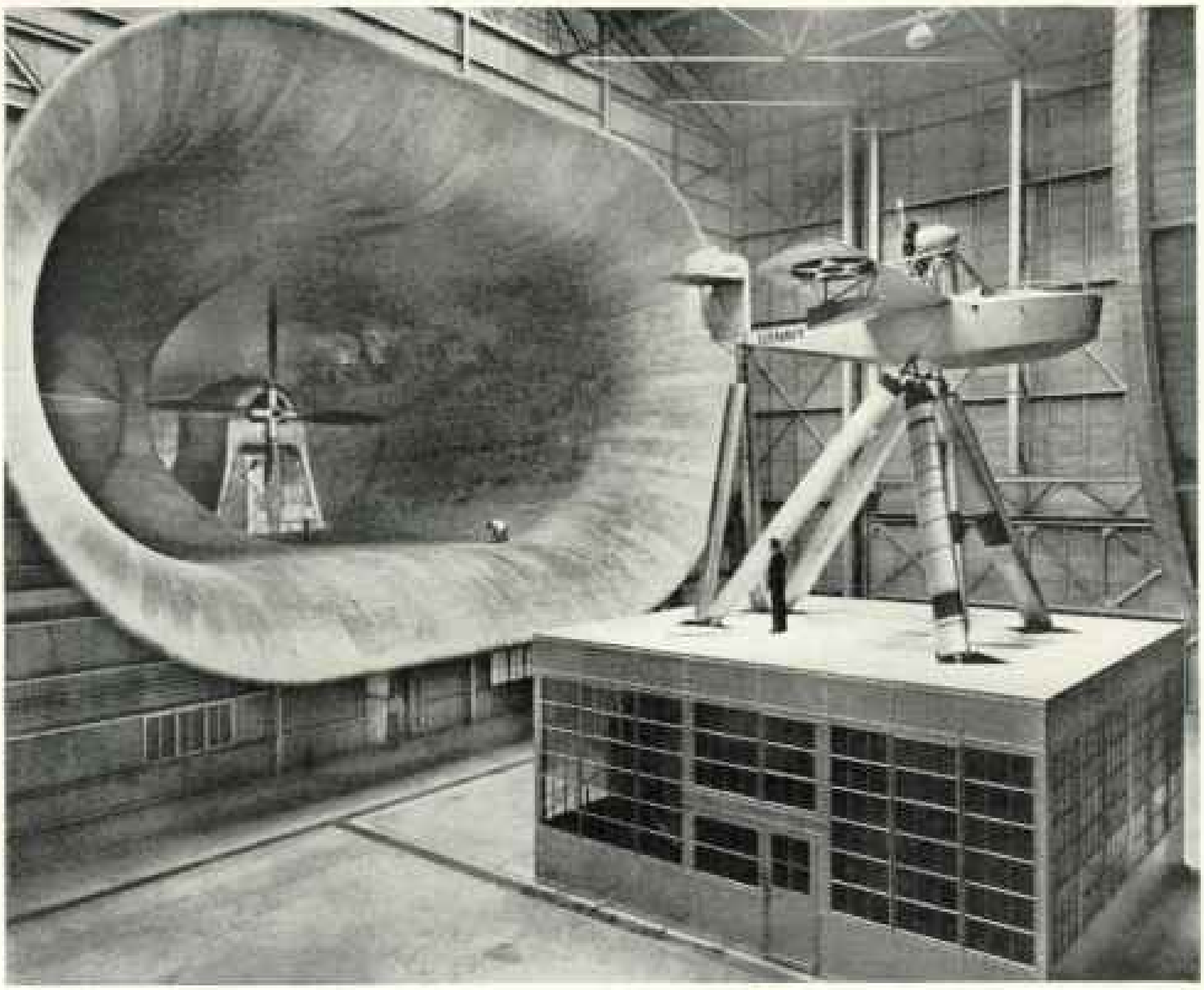
As we wing our way on toward Atlanta, on this flight from Richmond, each air station we fly over is on the lookout for us, because they got the teletyped message saying we had started; hence, over each station the pilot makes himself known by radio to lookouts below. Again, then, his position is reported to stations ahead by another teletype message, reading:

"Plane GH-4, Pilot Gill, passed over this station at 10:30 p. m., flying in a southwesterly direction."

All such words about our progress are received automatically by teletype, not only at stations along our route, but back at Richmond, our starting point. As we fly farther from Richmond, its beam gets wider in the air and fades out; as it begins to fade, the pilot tunes in on Greensboro, then Spartanburg, finally on Atlanta, and rides its narrowing beam into the airport.

Planes of the Eastern Air Transport now fly the 1,210 miles from New York to Miami, Florida, in 830 minutes. They leave Newark Airport at 8 a. m. and reach Miami at 9:50 that evening. A fleet of new Curtiss Condors, to carry a payload of 3,200 pounds and cruise at 145 miles an hour, with a top speed of 170 miles, has just been built for this line. Planes in this new fleet will fly this Atlantic Seaboard route in about 600 minutes, or in nearly four hours less time than aircraft in use as this is written.

Similar increase in speed across the continent will be achieved in 1933 by new planes of Transcontinental and Western Air, Inc., or "Lindbergh Line," and of the United Air Lines. Against the present coast-to-coast schedule of some 24 hours, improved craft are designed to make this flight, with mail, express, and passengers, in about 16 hours.



Photograph from National Advisory Committee for Aeronautics

A GIANT WIND TUNNEL IN OPERATION AT LANGLEY FIELD, VIRGINIA

This huge device, with its two 35-foot propellers, is used to test planes. Its size can be gauged by the man standing in its hornlike mouth. A gale of wind, artificially created inside, is blown against the plane, mounted outside, to show how the plane might act in a real gale. Winds of 115 miles per hour can be produced by this machine.

Planes fast enough to fly between any two points in the United States between dawn and dusk are now the objectives of aircraft engineers. With craft now in use, overnight deliveries of mail and goods can be made from our chief trade centers to points about 1,400 miles away.

But faster planes, now under construction, will in 1933 clip off five or six hours from present schedules, which will add another 1,000 miles to this overnight plane delivery zone.

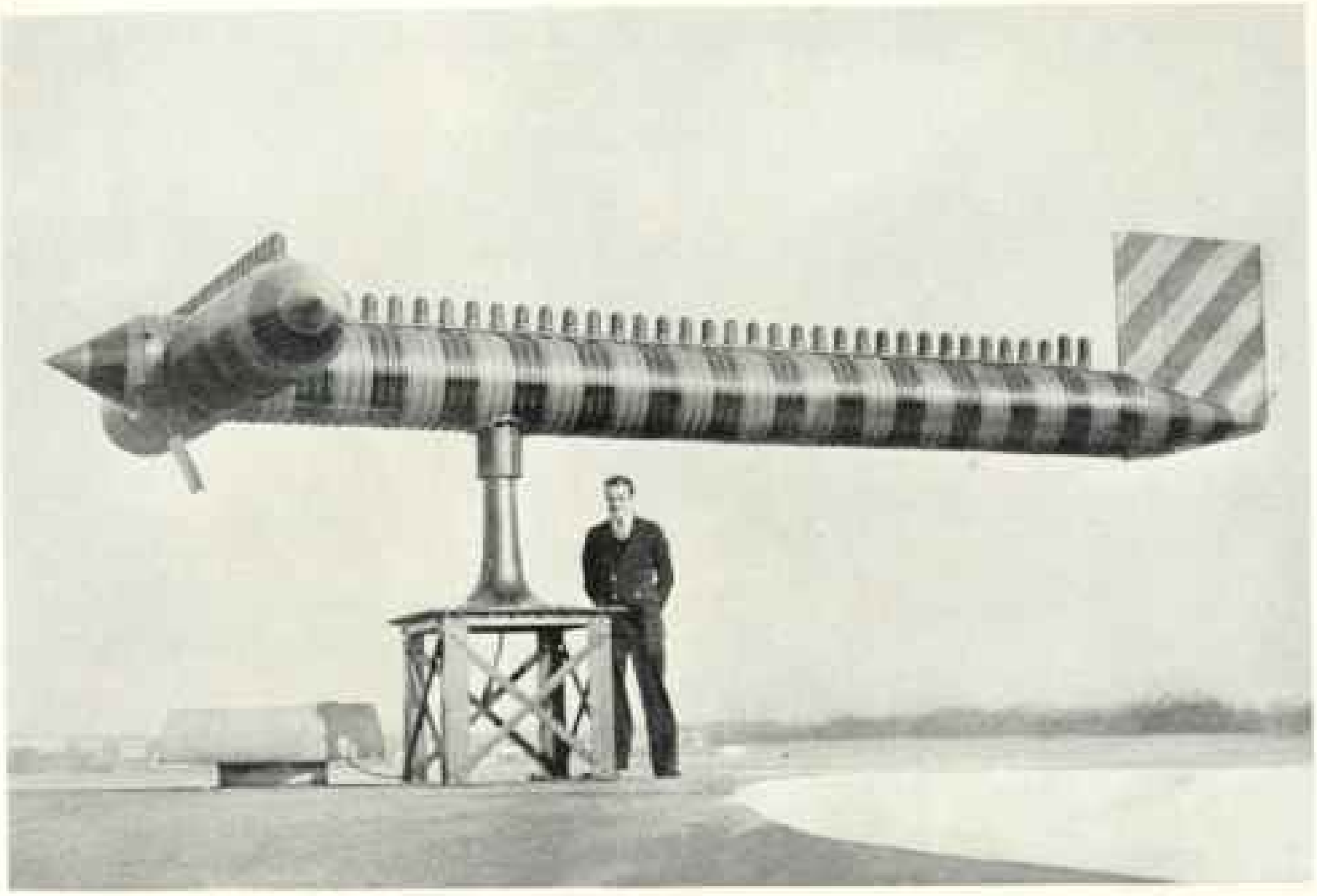
To handle this growing express business, several aircraft makers are studying designs for a special plane to carry nothing but cargo. To-day express is carried on mail and passenger planes, such goods usually being loaded in the wings of the large multi-motored planes, where there is space for several hundred pounds.

Separate express sheds at airports and fast cargo planes flying on regular schedule, as trade comes to make more use of swift air distribution of the lighter merchandise suited to it, all come into the plans of air-line operators.

Before many years have elapsed, air transport may earn more from freight than from passengers carried. As faster planes, now being built, come into use, so that express may be flown, say, from New York to Portland, Oregon, in one night, the amount of certain goods carried in stock and the methods of their distribution must all be affected.

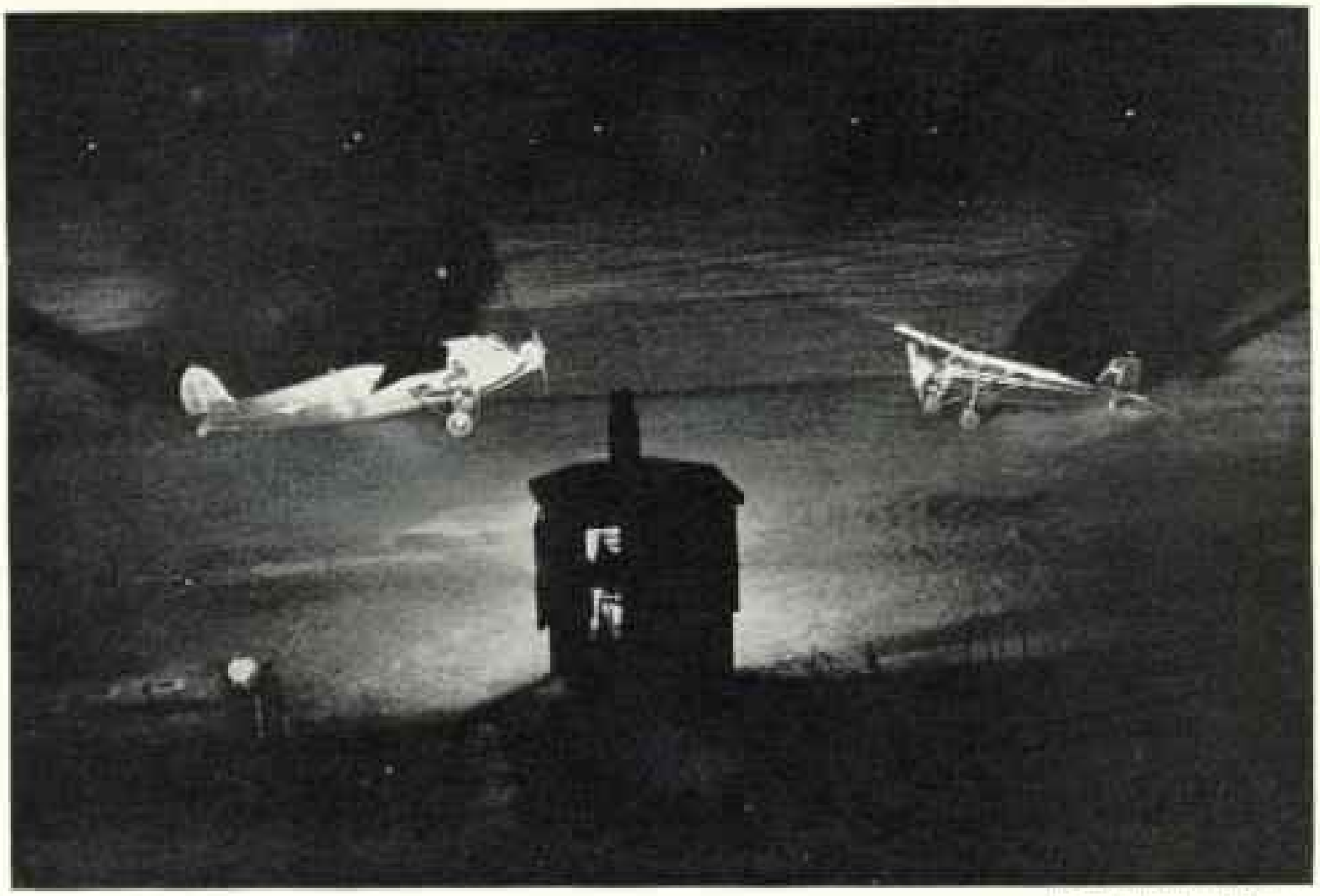
COMMUTING BY AIR

The extent to which industry and population tended to drift from crowded centers after the advent of motorcars and



A NEW WIND GUIDE FOR PILOTS AT THE CAMDEN, NEW JERSEY, AIRPORT

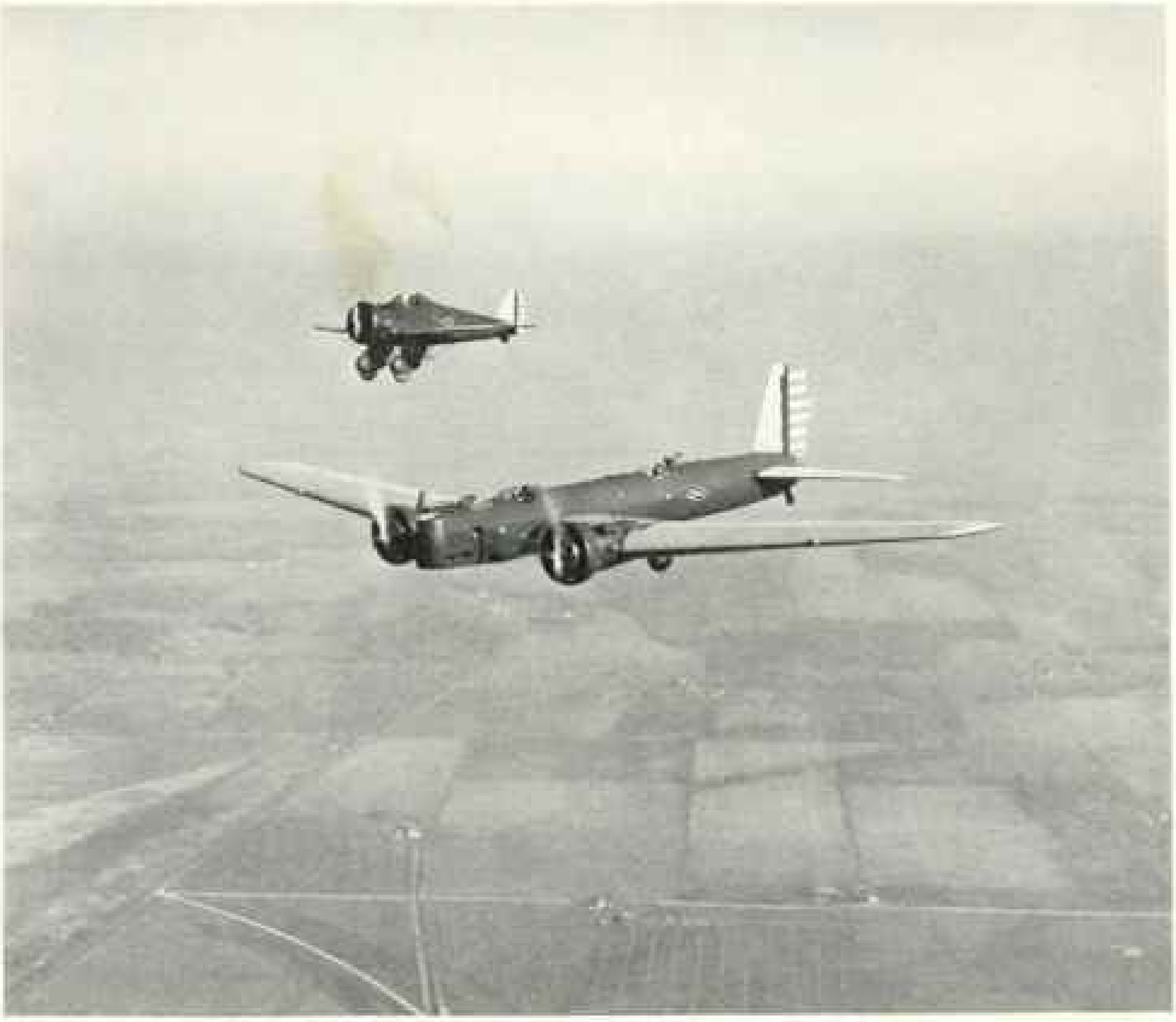
Like a giant striped crawfish, this wind tee is set atop a hangar to show the wind's direction. It replaces the outmoded wind-sock and is visible three miles away.



© International News

A 5,000,000-CANDLEPOWER AIRPORT FLOODLIGHT AT CAMDEN, NEW JERSEY

Lured like moths to the flame, these planes made a landing from the dark skies, guided by a giant new floodlight. It has a single lens, similar to those used in lighthouses.



Official photograph, U. S. Army Air Corps

AN ARMY BOMBER AND ITS PROTECTOR

Recent equipment of the Army Air Corps is the Boeing B-9 bomber and the Boeing P-26 pursuit airplane. This is the latest trend in the arms of two important branches of military aviation, bombardment and pursuit. The rôle of the large bomber is to drop its heavy load of bombs on the enemy; the rôle of the much smaller and swifter pursuit craft is to ward off hostile air attack upon the bomber.

trucks is a familiar fact in recent American history.

It is conceivable that, in the same way, but to a less extent, the growth of air transport and travel may also tend to change the location of certain industries and the habits of many people. It is easy, as air traffic improves and widens its scope, to think of people living on farms or in country towns and commuting by suburban air lines from a hundred miles or more away with less loss of time than the use of motorcars or suburban trains now involves.

Such commuting is already habitual with some air travelers. "I see the same faces over and over, week after week," said a hostess on a Washington-Philadelphia flight.

So many people sought seats on Washington-bound planes to attend the recent Roosevelt inauguration that extra ships were required to haul the crowds. They flew in "sections," like excursion trains. Races, popular football games, or other events which draw unusual numbers make the same demands for extra planes as for extra trains.

Of the 530,000 who bought air tickets in 1932, as against some 30,000,000 who rode the Pullmans, by far the great majority *flew to save time*.

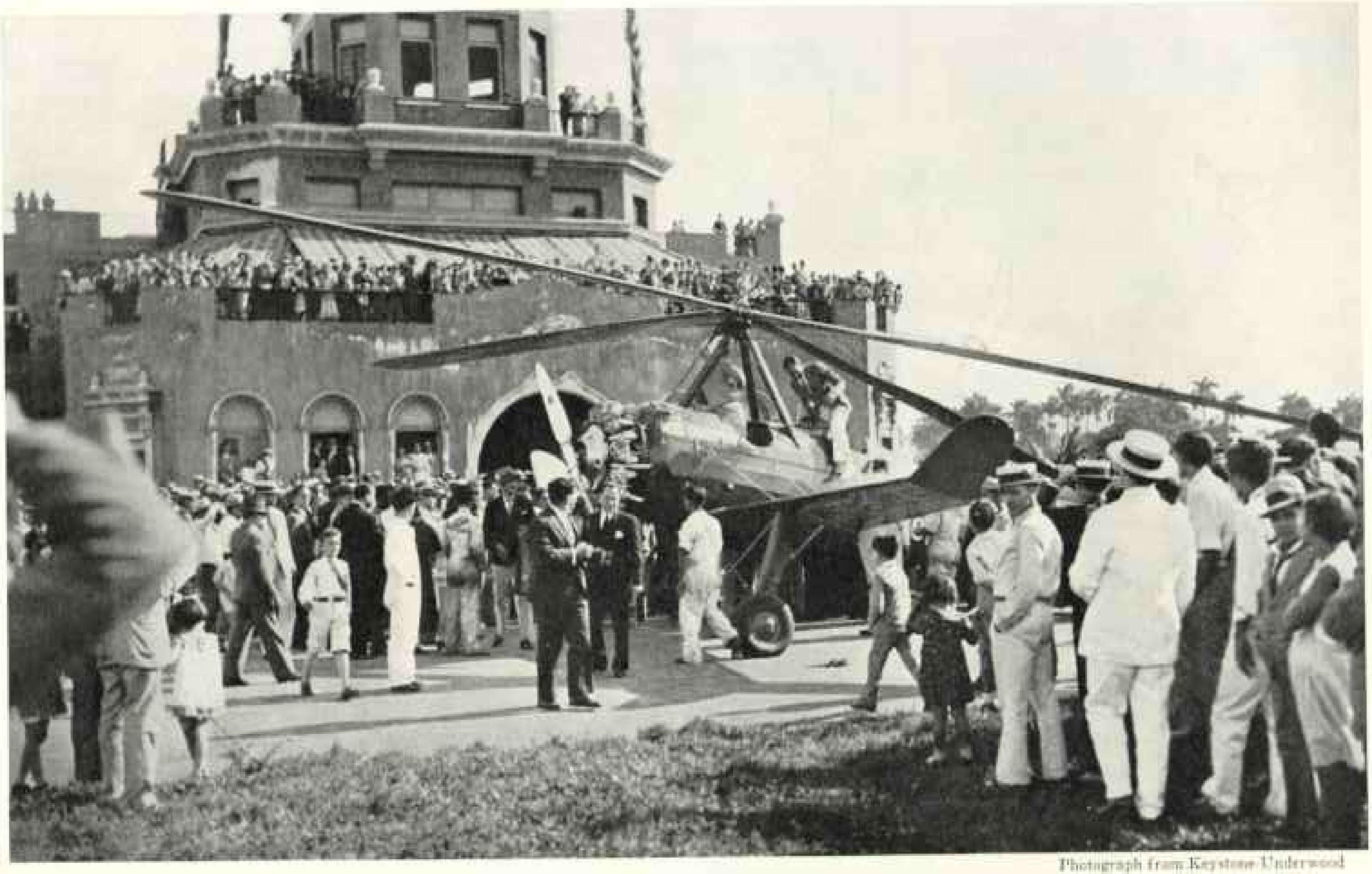
MANY "GO AIR" FOR RECREATION

While speed is the final reason for air traffic, there are increasing thousands who travel by air because of the entertainment and recreation obtained by visiting the

Photograph from Keystone-Underwood

TESTING A NEW HIGH-SPEED TRANSPORT PLANE BUILT IN CALIFORNIA

Shaped like some queer insect, with retractable landing gear, this new all-metal plane is designed to cruise at 200 miles, with a top speed of 235 miles, an hour. It has capacity for eight passengers, mail, and baggage.



Photograph from Keystone-Underwood

CUBANS AT MACHADO AIRPORT, HAVANA, SEE THEIR FIRST AUTOGIRO

Crowds greeted Capt. Lewis A. Yancey, transatlantic flyer, when he landed his autogiro, since his was the first plane of its type to visit that island country.

Photograph by Verne O. Williams

CRUISING BY AIR IN THE CARIBBEAN

In cabins larger than Pullman compartments, fitted with soft, roomy chairs, and wide, clear windows, long, unbroken journeys become short, interesting flights. A new city, often a different country, is revealed every two or three hours.

marvelous new world revealed by this modern method of transportation.

Everyone now may share the exhilaration of gazing down from heights that formerly were reserved only to those who by great physical exertion and exceptional physique were able to reach the mountain tops. To-day, comfortably seated in an armchair, anyone may soar like the eagle and within a few moments command a panorama even grander than the birds, because planes transport us to much loftier elevations than the birds attain.

The writer and his wife during the past year have thoroughly enjoyed 12,000 miles of air travel in the United States and West Indies on commercial passenger planes. Although we were in the air only 100 hours, we derived a more realistic picture of the geography of the country, of the relationship of great rivers, mountain ranges, plains, cities, and islands, than years of travel otherwise afforded.

From aloft one sees as one piece man-made works too large to comprehend from the ground, and one also beholds glories of Nature which are unsuspected by the earth-bound pedestrian.

Only from the air can one appreciate the magnificence of the blaze of illumination from our great cities at night—New York, Chicago, Los Angeles.

Indelibly stamped on my memory is the continuous procession of gayly lighted towns which we looked down upon during a night flight from Columbus to Kansas City.

One morning we arrived at Wichita to find a temperature of 100 degrees at the landing field. In 30 minutes our pilot climbed above the clouds to take advantage of a fair wind, and the air became so cool that ventilators were closed, overcoats and wraps donned, and the heat turned on. Then, comfortably at 12,000 to 14,000 feet, we continued for several hours to Amarillo

Courtesy Pan American Airways

THE GIANT AIR-LINER, AFTER ALIGHTING ON THE LOVELY BAY OF PORT-AU-PRINCE, IS BEING WARPED TO THE DOCK

Photograph by Gilbert Grosvenor

REFUELING A CLIPPER SHIP AT SAN PEDRO DE MACORÍS, DOMINICAN REPUBLIC

The advent of this modern means of swift, easy travel has brought remote and romantic Caribbean islands within a few hours of the United States.

Photograph by Gilbert Grosvenor

TO ACCOMMODATE THE HUGE FLYING SHIPS, SPECIAL DOCKS, STATIONS, AND PERSONNEL ARE PROVIDED AT EVERY PORT: NUEVITAS, CUBA

and Albuquerque, while all below us were suffering from intense heat.

MOUNTAINS, CANYONS, PLAINS, RIVERS

We passed a river whose water, as seen from the air, was as red as blood—the Cimarron—and for many hours flew within sight of another, the Canadian. Crossing New Mexico and Arizona, we gazed down on mountains, canyons, and plains of many gorgeous hues—brilliant yellow and red terraces, jet-black and purple cliffs, or soft gray and pink slopes. Superb was the aspect of the glorious valley of California, stretching hundreds of miles northward, girt on both sides by stately mountain ranges.

We had dined at Pittsburgh Thursday at 7 p. m., slept from 3:00 to 8:00 a. m. in a Kansas City hotel, and dined in Los Angeles at 9:30 p. m. Friday.

On another morning, when weather conditions were ideal, we left Portland, Oregon, on a United Air Lines mail plane bound for Salt Lake City. So crystal clear was the atmosphere that as we followed the Columbia River from our 8,000-foot elevation we could identify all the famous snow-covered peaks of Washington and Oregon; to our left Mount Rainier, Mount Adams, Mount St. Helens, and even Mount Baker, 200 miles distant; to our right Mount Hood and Mount Jefferson. From comfortable armchairs we watched a panorama of mountain, valley, and rivers unsurpassed anywhere on the globe.

Soon we were flying over the ocean of golden wheat of southeast Washington; then across the Blue Mountains of Oregon, along the deep, tortuous black canyons of the Snake River; over the hot, brown, barren hills and valleys of Idaho, occasionally relieved by the green, checkered fields of irrigated communities, to arrive, seven hours from Portland, over the Great Salt Lake.

The lake's glistening, still, blue waters, fringed with encrustations of salt and reflecting the red, encircling mountains and lazy white clouds overhead, presented a scene of indescribable beauty as we glided down to the city.

To-day plans for regular transatlantic air traffic are fairly well worked out.

From the days of Lindbergh's stupendous venture, and Byrd's thrilling flights, we have seen air traffic become a strong, dependable factor in American business.

HOW THE UNITED STATES GREW

By McFall Kerbey

Author of "Colorado, a Barrier That Became a Goal," "Toilers of the Sea," and "Genoa, Where Columbus Learned to Love the Sea," in the National Geographic Magazine

ON OUR Map Supplement of the United States the blue of the rivers, lakes, and seas represents features that existed ten thousand years ago.

Other colors and markings—the black of cities and towns and railways, the red of highways, the various tints of State lines—show the works of man wrought in the few hundred years since Western civilization came to the New World.

In one sense the United States has made its growth by leaps and bounds. Stages of advance have been marked out suddenly from time to time by the purchase of vast areas, the various territorial accessions. Addition of these large blocks of territory and the more steady march westward of the works of man have left their marks on the map, like the growth rings that each year are deposited in the fiber of living trees.

Changes that have built the map of to-day from the meager charts of the original Colonies have taken place in the 157 years since the signing of the Declaration of Independence.

Only by compressing years into seconds, and by creating a map that would grow before our eyes, could we portray the epic growth of the Nation.

On such a map America would first be a vague wilderness. Then would appear a dot representing Jamestown, first permanent community of white settlers in the territory of the original thirteen colonies. Others would flash forth up and down the seaboard: New York, a pin-point prophecy of the vast metropolis of to-day; Plymouth and the tiny village of Boston; Charleston, Philadelphia, Baltimore, Savannah.

FUTURE STATE LINES APPEAR

Colony lines, some to mark future States, would appear. First Massachusetts, then Rhode Island, Maryland, and the others. Virginia claimed territory for many hundreds of miles west and northwest at this time, and some of its boundaries were too indefinite to be mapped.

In 1792 separate statehood made the momentous first step west of the Alleghenies as Kentucky's lines ran out in their own right (the area had been a part of Virginia), the first State to reach the once remote Mississippi River, at that time the ultimate western boundary of the Nation. Before the turn of the century Tennessee's boundary marks also marched westward to the Great River.

The fledgling Union was beginning to feel cramped even by the beginning of the 19th century, especially on the southwest, where France sat astride the Mississippi threatening to dam that river's waxing commerce.

HISTORY'S LARGEST REAL-ESTATE "DEAL"

Ohio's outlines had barely taken map form in 1803 when another huge territory was pegged out for future States, the Louisiana Purchase, which more than doubled the area of the original Union.

This taking over of 909,130 square miles by the stroke of a pen was probably the greatest real-estate transaction in all history. For this potential empire the United States paid France in all—principal, interest, and debts assumed—$23,213,567.73. It works out at a little less than four cents an acre!

The purchase was a happy accident—a bit of high-handed patriotism that lawyers have said "strained the Constitution."

Robert R. Livingston was sent in 1801 by the United States as Minister to France to attempt to buy the "Island of New Orleans," on both sides of the Mississippi, and so to gain control of the mouth of the river. He was authorized to offer $2,000,000 and, if necessary, to go as high as $10,000,000 for the patch of land.

Negotiations dragged on for two years, when suddenly war was declared on France by Great Britain. More to embarrass Great Britain than to accommodate the United States, Napoleon decided to sell the entire Louisiana Territory. The historic decision was reached while the First Consul was in his bath.

James Monroe had joined Livingston as a special commissioner, and to them was made the proposal to sell. The French negotiators asked $15,000,000—an amount once and a half as great as the highest authorized figure.

© International News

AMERICA'S LARGEST PASSENGER SEAPLANE FLIES OVER HER LARGEST CITY

Made from an accompanying airplane, this view shows the huge *American Clipper* soaring over New York as part of an air show staged for the benefit of the unemployed. The plane, christened by Mrs. Herbert Hoover, seats 44 passengers and five members of the crew. Only the German DO-X surpasses the Clippers in passenger accommodation. Manhattan, with real estate now assessed at more than sixteen billion dollars, was bought for $24 when America's map was in the making in 1626.

The two Americans were aghast. Cables and steamships did not exist. To get word to America and an answer back would require many weeks. Napoleon was in a hurry. So the two envoys figuratively threw their instructions out the window and signed the agreement. President Jefferson and Congress approved the contract and on December 20, 1803, the Stars and Stripes were run up over New Orleans.

Nobody knew enough about the new domain west of the Mississippi to draw an intelligible map of it. They knew only that there were prairies and "deserts"; that beyond were mountains of some sort; and that somewhere farther on, maybe hundreds, maybe thousands of leagues away, lay the half mythical South Sea.

Lewis and Clark, and soon after them Capt. Zebulon Pike, struck into the new country to see what it was like, and as a result of their explorations Americans began to learn a few things about their vast West.

CALIFORNIA MAPPED AS AN ISLAND

Even when Captain Cook touched the coast of Oregon, in the decade of American Independence, he had a map showing California to be an island. The existence of Great Salt Lake was not definitely established until 1824, when Jim Bridger went down the Bear River to its waters.

Several years later Bridger ran on to Yellowstone and its geysers; but his fairly accurate report of the natural marvels of the region only earned him a reputation as a Marco Polo of our West. The facts about Yellowstone were not finally checked until 1870.

When Powell led his party of adventurers by boat down the Colorado River,

Photograph from Tropical News

AT MIAMI, FLORIDA, TOURISTS BOARD A CLIPPER FOR THE FAST HOP TO HAVANA

This short flight from Florida to Cuba, made now in the huge, comfortable "American Clippers," has become a popular air excursion. From 100 to 200 passengers make this cruise every day during the winter months.

in 1869, they were the first to navigate the stream through its long canyons, although the early Spanish explorers had seen the Grand Canyon from above 300 years before.

The Florida Purchase, in 1819, involved a relatively small area. That acquisition really made the United States smaller than it was before. The treaty with Spain definitely marked the eastern and northern Spanish boundary all the way from the southeast point of Texas to the northwest point of California.

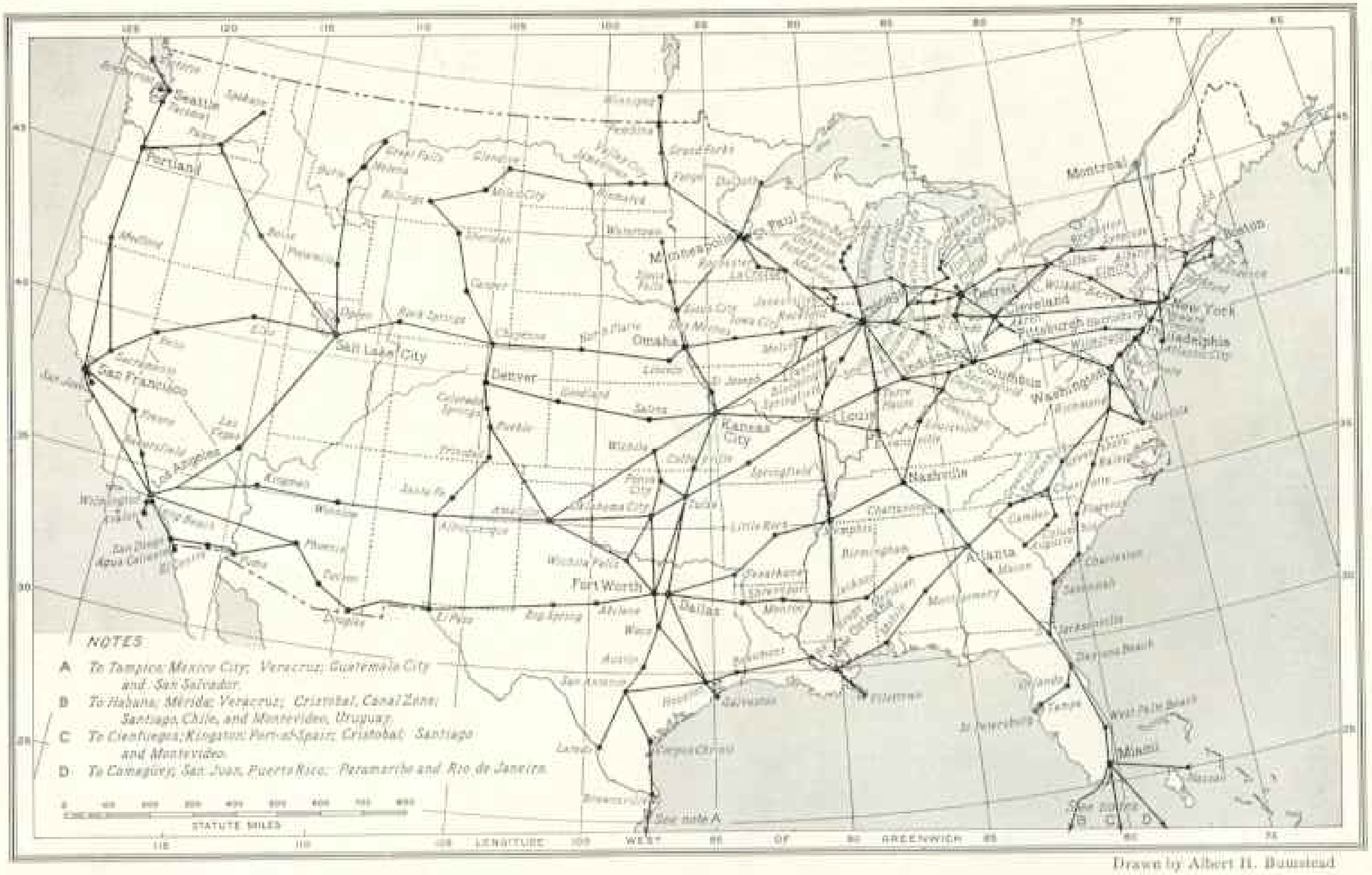
Parts of present Oklahoma, Kansas, and Colorado draining to the Arkansas—areas which had been thought to be in the Louisiana Territory—were lost to the United States by the treaty and had to be bought back from Texas later.

More territory came to the United States in the decade 1840-1850 than during any other ten years in its history. Texas was added in 1845; the title to Oregon Territory was established by treaty with Great Britain the following year; and the cession from Mexico in 1848, at the close of the Mexican War, brought in the California country and all the region east to Texas. In all, the forties added to the United States map more than 1,200,000 square miles of territory—an area larger than 20 Floridas.

THE CASE OF TEXAS WAS UNIQUE

The Texas addition was unique. Texas had existed for nearly ten years as an independent republic, with diplomatic representatives in Washington and at European courts and with foreign ministers in its own capital. A separate nation entered the Union, the only case of the sort in United States history. More than 388,000 square miles of territory were added by the Texas accession.

There was rejoicing when the Oregon matter was settled, even though the "Fifty-



Drawn by Albert H. Bumstead

AIRWAY ROUTES OF THE UNITED STATES, FOR PASSENGERS, MAIL, AND FREIGHT, ARE RAPIDLY DEVELOPING AND EVER CHANGING

This map shows air mail and passenger routes operated April 1, 1933.

Photograph by Ewing Galloway

MANY AIRPORT BUILDINGS ATTAIN RAILWAY-STATION SIZE

This structure houses the offices, waiting room, and dispatching rooms of the United Airport at Burbank, near Los Angeles, California.

Photograph by Acme

A PASSENGER PLANE MAKES A NIGHT LANDING AT KANSAS CITY

Courtesy Coast and Geodetic Survey

THE GEODETIC CAPITAL OF NORTH AMERICA (SEE PAGE 649)

The point marked by a cross-line on a bronze plate set in the sunken slab of concrete is the most important spot in the New World to surveyors of three nations. It is the primary station of the carefully surveyed triangulation network that the United States Coast and Geodetic Survey has extended over this country. Canada and Mexico have both linked their precise surveys to the system and refer them to this same station in Osborne County, Kansas.

four-forty or fight" slogan was not lived up to. Here was a shining milepost in the history of the United States. In 70 years from the Declaration of Independence the new Nation had pushed across nearly 3,000 miles of virgin territory, had brought almost half of it into statehood, and had marked the other half for future development.

Balboa's hazy sea had become the incontrovertible Pacific, and in that mighty ocean the United States had now taken the first step to establish its vital interest.

After the California country (including the present Arizona, New Mexico, Nevada, Utah, and part of Colorado) became United States territory, in 1848, the developments that mean map changes came to the Far West with dizzy speed. One of the world's greatest gold rushes started in '49. By 1850 so many people had poured in that California was made a State.

This was another outstanding milestone. Statehood had hurdled hundreds of miles of territory and had made its first appearance on the shores of the Pacific.

By 1850 railway trains were puffing back and forth from Massachusetts to Georgia, and even west of the Alleghenies; yet California still was farther out of travel reach with the seat of Government than even the remotest of the thirteen original States had been in the days of Thomas Jefferson.

California needed all the delays for certifying votes and shifting administrations that the Constitution had provided. The pony express had not yet been conceived. Even camel caravans were being considered, and were later tried, to tie the lonely Pacific State to the rest of the Union.

Several weeks were required to get mail overland past hostile Indian tribes; and if it went by water, by way of the Isthmus of Panama, not weeks, but months were consumed.

COST OF UNCLE SAM'S REALTY

In almost every important addition to its territory which the United States has made, save Oregon Territory, a money payment has played a part.

© International News

UNITED STATES CUSTOMS INSPECTORS EXAMINING AIR BAGGAGE AT MIAMI, FLORIDA

Following arrival over the fast Pan American Express route from Central and South America, passengers submit their luggage for inspection. Uniformed stewards accompany each seaplane, serving light luncheons to passengers, who find a perfectly appointed terminal at their convenience in every port. Two restaurants, a waiting room, observation balconies, and customs and immigration offices are included in this building at Miami.

It is easily possible to figure how much it has cost in direct payments, whether to foreign nations, States, or citizens, to assemble the major territorial additions to this Nation.

The Louisiana Purchase cost $23,213,567.73; Florida cost $6,674,057.47, including interest; Texas and its creditors were paid $15,496,447.77 to relinquish claim to lands outside the present State boundaries; Mexico was given $16,295,148.89 for its cession of territory in 1848.

In 1854 the final addition was made to continental United States as it now exists, when the Gadsden Purchase was made of 29,670 square miles south of the Gila River, in Arizona. For this tract $10,000,000 was paid to Mexico.

These five accessions to the United States proper cost $71,679,221.86.

A circle with a radius of only 1,000 feet drawn around the business center of Washington, D. C., incloses land assessed for almost exactly the amount paid for this far-spreading empire.

And these valuations could be duplicated in any one of the dozen or more cities in the United States with populations of more than half a million.

Territory outside the borders of continental United States bought since 1854 was more costly. Russia was paid $7,200,000 for Alaska in 1867; the Hawaiian national debt of $4,000,000 was assumed when the islands were annexed, in 1898; Spain was given $20,100,000 for islands annexed after the Spanish-American War.

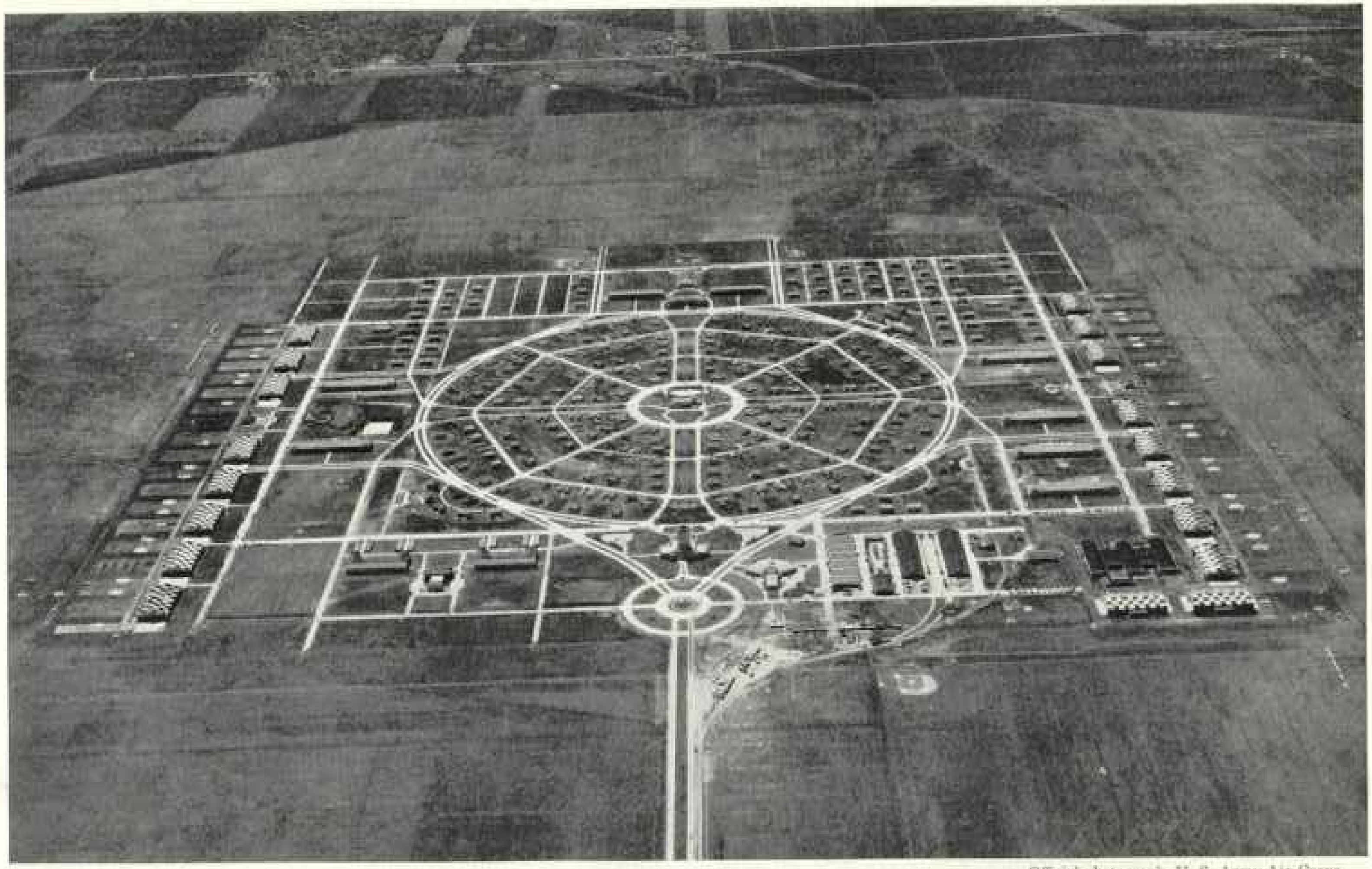
The ten-mile strip of the Canal Zone in Panama has cost the United States so far $15,000,000 paid to Panama and $25,000,000 paid to Colombia. In addition, the United States paid $40,000,000 to the New Panama Canal Company of France. And Panama continues to receive $250,000 annually.

The latest territorial purchase by the United States was the Virgin Islands. For the 133 square miles of these Caribbean islands Denmark received $25,000,000 in 1916. That works out approximately $294

Photograph by Fairchild Aerial Surveys

THE "AMERICAN CLIPPER" IS THE PULLMAN OF THE SKIES

Each of its five cabins is wider than a Pullman compartment. Seats are copied after Queen Anne easy chairs. The four motors are well removed from cabins, which are sound-proofed, so that conversation in a normal voice may be heard. Ceilings are eight and a half feet high, and broad, carpeted aisles permit free movement about the ship. The ship must taxi about one mile to gather speed for the take-off (see pages 629, 630, 632).



Official photograph, U. S. Army Air Corps

THE UNITED STATES ARMY FLYING SCHOOL, RANDOLPH FIELD, NEAR SAN ANTONIO, TEXAS

White cement-paved streets form the geometric pattern. The checkerboards are hangar roofs. Flying cadets from civil life, as well as officer-students in the Regular Army, are given preliminary training here.

Photograph from Keystone-Underwood

THE WEST'S LONGEST BRIDGE OF THE MOMENT

Carquinez Strait, over which this 4,482-foot structure extends, connects the two northeastern extensions of San Francisco Bay. Calvin Coolidge, while President, pressed a gold button which formally opened the bridge. San Francisco Bay, with its potential ports, was one of the most valuable assets that the Mexican Cession of 1848 brought to the United States (see text, page 637).

an acre—7,350 times the acre price paid for the Louisiana Purchase.

ALL PURCHASES PAID IN CASH

The total payments for outlying territory made since 1854 amount to $136,300,000.

These payments have all been in cash. Barter and land trades have never played a part in the growth of United States territory, as they did with the Dutch, who purchased Manhattan Island for twenty-four dollars' worth of trinkets; and the English, who later got all Dutch claims to Manhattan and the rest of New York State in trade for what is now Dutch Guiana.

On the map of the United States, blocked in by its accessions between 1783 and 1854, man's marks have grown with steady acceleration. Two trends have stood out: a constant extension to the west; and a growing concentration in the east, where rapidly developing industry has gathered population into urban centers.

The dots of cities and towns have popped into place through the years like seeds scattered by a sower. Roads have pushed out into virgin territory; then canals; then railways. Since the coming of the automobile age, highway construction has gone on at an astounding rate.

The marks denoting all these developments have crossed and criss-crossed on the map until now in large areas they re-

Photograph by Fairchild Aerial Surveys

THE MUNICIPAL AIRPORT AT BOSTON, MASSACHUSETTS

Boston is one of the country's important centers of air traffic, and more than 25,000 air passengers took off or landed at this field last year. The landing field, which is mostly on made ground, lies just across the Inner Harbor from the central part of the city. A tunnel under the river is contemplated, which will make downtown Boston only a five-minute journey.

semble the intricate tracery of tiny surface cracks in ancient chinaware.

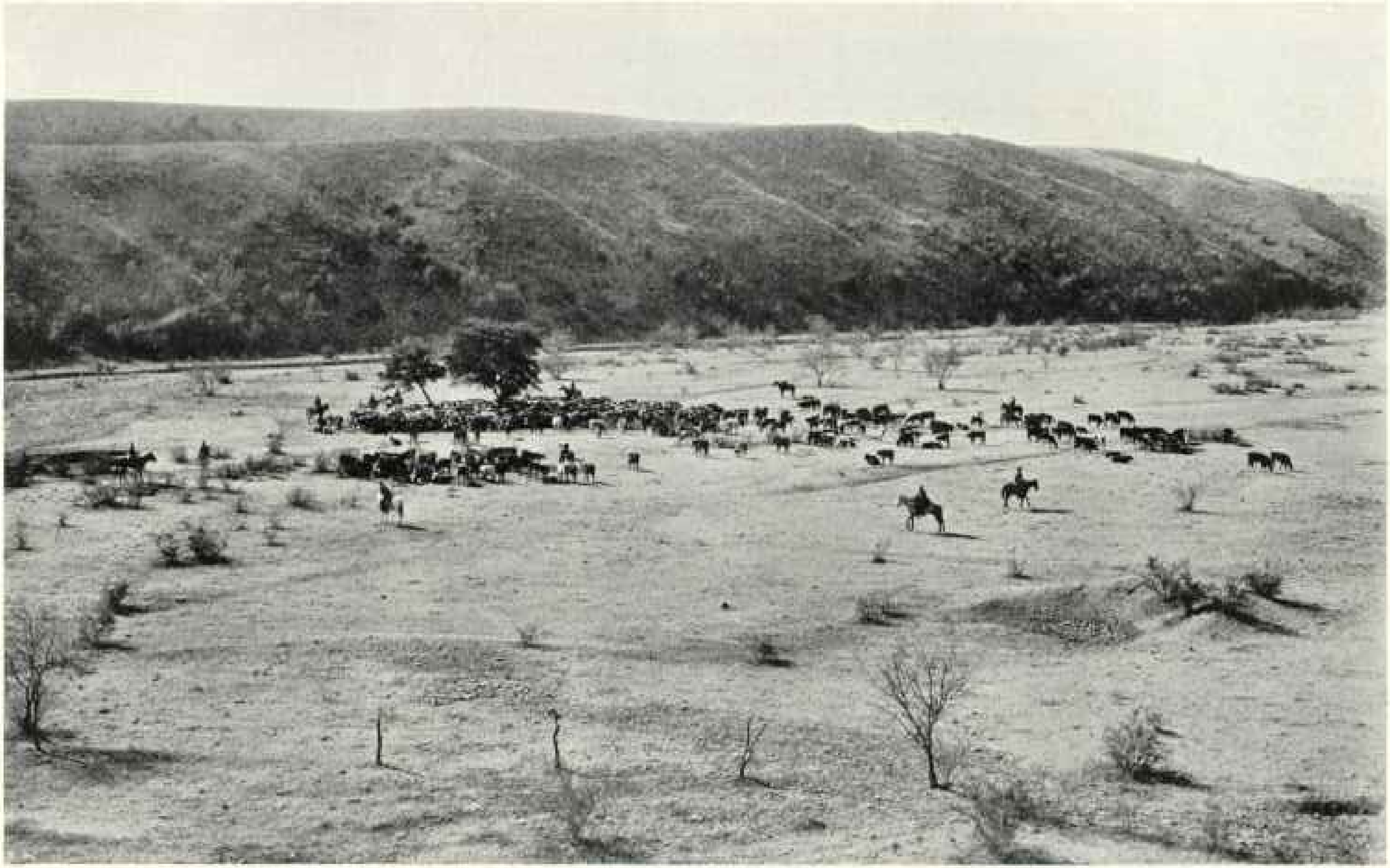
No one can look closely at the boundaries of the United States and at those of the Commonwealths themselves without being struck by certain peculiarities. What, for example, is the explanation of the tiny "tab" that juts into Canada near the 95th meridian, almost exactly at the mid-point of the international boundary?

This bit of territory, wholly separated from the rest of the United States by water, is a monument to the hazy ideas of northwestern geography in the 18th century. The treaty of peace with Great Britain after the Revolution provided that the boundary line from Lake Superior should run to "the most northwestern point" of the Lake of the Woods, and from there should be extended "on a due-west course to the River Mississippi."

Not until years later was it discovered that the Mississippi is not west, but southeast of the lake! When still later the 49th parallel of latitude was agreed upon as the international boundary to the westward, a line was dropped south to it from the lake corner, leaving the odd "tab" jutting 27.5 miles into Canadian territory.

THE LONGEST EAST-WEST BOUNDARY

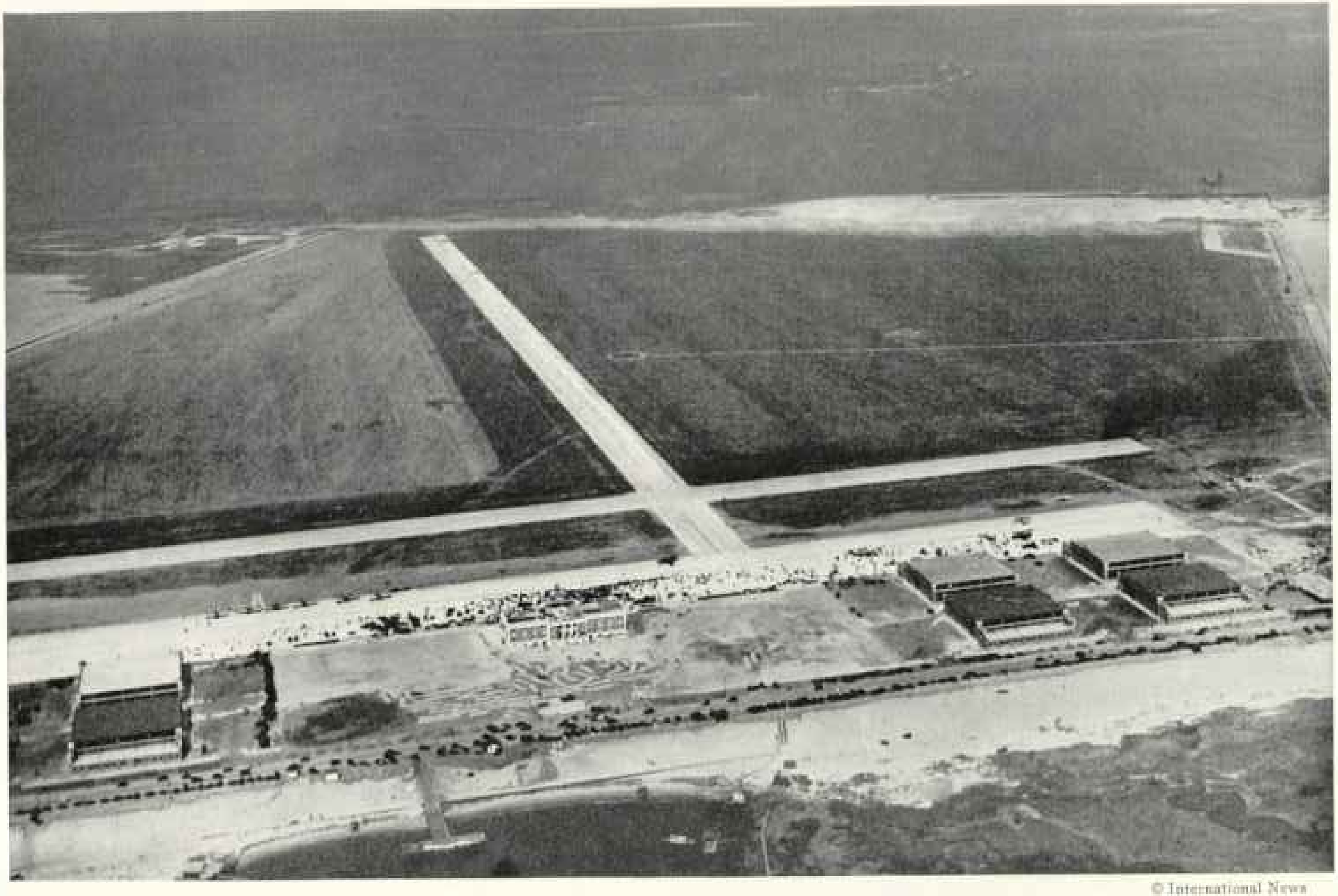
The line that strikes westward from the "tab" to the waters of the Pacific and forms part of the international boundary is the longest line following a parallel of latitude on the United States map. It is 1,269 miles in length and is marked by more than 900 monuments.



Photograph by Clifton Adams

WHERE A WIRE FENCE DIVIDES TWO NATIONS

This stretch of the Mexico-United States boundary at the southern edge of Arizona is a surveyed line across a semi-arid valley. The row of posts in the foreground supporting a few strands of barbed wire marks the border. The cattle, from Mexico, are being held awaiting the arrival of customs officers so that they can be driven to the stockyards of Nogales, Arizona. The opposite city, on the Mexican side, also is named Nogales.



© International News

LOOKING DOWN ON GOTHAM'S NEWEST AËRIAL DEPOT

On Barren Island, far below, is seen the newly completed Floyd Bennett Airport, showing the modern hangars, the ideal long runway, and other facilities which help make it one of the foremost municipal airports in America. Huge crowds assembled for the ceremonies when it was opened to traffic. From here an air armada of 672 planes took off for a flight over New York City (see map, page 549).

Photograph by Acme

AIR VIEW OF THE UNITED AIRPORT, BURBANK, CALIFORNIA

For the information of pilots and passengers, the identifying name "Burbank" is painted on a hangar roof (see illustration, page 635). Such markings are now prevalent. Through such facilities the map of the United States has shrunk amazingly. From Burbank the continent has been crossed by air in less than eleven hours. When California became a State, in 1850, the overland crossing by stage required 34 days.

For hundreds of miles this international line runs through heavy forests, and it was necessary to chop down thousands of trees to form an alley through which the surveying instruments could be sighted.

The length of the entire Canada-United States boundary overland, through lakes and rivers, bays and sounds, is 3,986.7 miles. Approximately 1,788 miles of it is land boundary and 2,198 miles water.

In contrast, the entire Mexican boundary is 2,013.4 miles long—about 673 miles land and 1,340 miles water.

The Rio Grande, which forms nearly two-thirds of the Mexican line, has continually shifted its course throughout several long stretches. Many times Texans living in river bends have gone to bed in the United States and have waked up in Mexico.

These bits of territory cut off by erratic river changes are called "bancos." The matters of settling the sovereignty of bancos and of marking the boundary line after their formation have been the subject of several treaties with Mexico and keep the United States-Mexican International Boundary Commission busy.

Twenty-five miles below El Paso, as a result of a major shift years ago, there is a considerable area of United States territory extending as much as a mile south of the Rio Grande as it runs to-day. A gentle little dale grown over with grass, once the bed of the river, is now the actual international boundary in this area, and at places even the slight sag is not noticeable.

Cultivated fields reach this line at many points. Not long ago United States customs officials brought charges against a farmer in this neighborhood for import-

Photograph from International News

AN ODD LANDING FIELD AT AVALON, SANTA CATALINA ISLAND, OFF SOUTHERN CALIFORNIA

This new port was added to the country's long list when Douglas amphibian planes, swooping gracefully out of the sky, came to rest on the surface of the island waters and taxied onto a neat little turntable.

ing cotton without a license. The farmer had inadvertently set his field fence some four feet south of the international line. When he harvested his crop he merely followed the entirely lawful routine of all his farmer neighbors in picking ninety-nine one-hundredths of his cotton; but when he plucked the lint from the row or two nearest the fence he ran foul of the Federal customs laws and technically became a smuggler.

The odd shape of the surveyed lines that form the Mexican border west of the Rio Grande resulted from the Gadsden Purchase of 1854. The Gila River, in places a hundred miles north of the present border, was selected as the international line at the end of the Mexican War.

A principal reason for the purchase that pushed the lines south was to include a good site for a transcontinental railroad along the southern route. For 300 miles across Arizona the Southern Pacific Railroad now runs through this territory that was bought as an afterthought.

NO STATE HAS COMPLETE NATURAL BOUNDARIES

In contrast to the map of Europe, where almost every country is surrounded by the crooked lines of natural boundaries, the map of the United States shows numerous straight lines as the boundaries of States. This is especially true of the region west of the Mississippi, where the level prairies offered few ready-made boundary marks.

Not a single State of the Union is outlined wholly by natural boundaries. New Jersey comes nearest, with the bulk of its bounds formed by rivers and the waters of the Atlantic Ocean.

Only the short northern boundary from the Hudson to the Delaware River is a straight surveyed line.

Courtesy Northrop Corporation

IN THIS NEW MONOPLANE LINCOLN ELLSWORTH WILL ATTEMPT THE FIRST CROSSING OF ANTARCTICA

Already tested with skis for ice-field landings, this plane flies at top speed 230 miles an hour. Ellsworth will try in the fall of 1933 to fly over Antarctic wastes from Bay of Whales to the desolate shores of the Weddell Sea and return, about 2,900 miles.

Two States, Colorado and Wyoming, are each bounded by two straight lines and two slightly curved parallels of latitude. On the map they appear as rectangles. Utah has six such boundaries.

One of the queer quirks in the geometry of State boundaries is that while every State has at least one point on its borders where three States meet (Tennessee heads the list with eight such points), there is only one place in the United States at which four States meet. This latter point is the common corner of Utah, Colorado, New Mexico, and Arizona.

This unique boundary crossing lies not far south of the San Juan River, remote from highways, and has probably been seen by only a few hundred people. It is marked by a rectangular stone post with its corners north, south, east, and west, and the names of the four States on the faces of the stone.

Delaware presented one of the most difficult geometrical problems encountered in laying out the States, for it has as its north boundary the only portion of a circle used as a State boundary. It is part of "a circle measured horizontally," drawn with a radius 12 miles from the center of the town of New Castle.

THE MASON AND DIXON LINE

The arc takes a noticeable "bite" out of the southeast corner of Pennsylvania. The circle also makes a tiny dent in the east line of Maryland.

The southern boundary of Pennsylvania was another difficult line to establish, especially in the 18th century. It was to pass through a point 15 miles south of the southernmost point of Philadelphia, and was to be extended due west, not a certain distance in miles, but "five degrees in longitude" from the Delaware River.

Two famous mathematicians, Mason and Dixon, were brought over from England to mark out this line between 1763 and 1767. They established it with accuracy. As the "Mason and Dixon Line," it has marked the division between sections

Photograph by J. Winton Lemen

AIRCRAFT HELPED FIND LAKE ERIE FISHERMEN LOST ON FLOATING ICE

Fishing offshore, through ice-holes, these men were imperiled when their floe broke loose and floated away. With sticks used in their canvas shelters they spelled out the words "Help" and "Eats" in the snow.

as well as States and has found its way into literature and song.

Marking long lines on the surface of the earth is a difficult task. Surveyors can seldom accurately know "straight up," especially in rough country, where differences in gravity pull plumb bobs and spirit-level bubbles to one side. When the supposed vertical lines of instruments are not really vertical, surveying errors inevitably creep in.

OUT-OF-PLACE BOUNDARY LINES

Absolute accuracy is so difficult to attain that probably not a single surveyed line used as a State boundary is marked out on the ground exactly where statesmen and surveyors intended it to be. Some of the errors are easily discernible on a map.

This is particularly true of lines run hundreds of years ago, when instruments were crude, when some surveyors were careless, and when others were even willing to divert lines to include or exclude the farms of influential landowners. The existence of Missouri's southeastern "panhandle" is said by local historians to be owing to the solicitations of the holder of a large plantation between the Mississippi and St. Francis rivers.

Some of the old lines have been the cause of long controversies between States and a few are still the subjects of actions before the United States Supreme Court; but in the majority of cases the lines have been accepted as marked. Such lines are well understood to be out of their theoretical places, but they are the official boundaries.

One of the most conspicuous examples of out-of-place boundary lines is the important east-west line that separates Virginia and North Carolina, and Tennessee and Kentucky; is common to Missouri and Arkansas; and appears again farther west as the north boundary of the Texas panhandle. Throughout its course this line is theoretically a parallel along 36 degrees 30 minutes of north latitude.

In reality the boundary on the ground is made up of broken and slanting lines and is full of jags. It is north of its supposed position until the Tennessee River

is reached, 700 miles from the starting point on the Atlantic coast. In places it is from 5¼ to 12 miles too far north. West of the Tennessee River and west of the Mississippi, the lines are fairly close to their proper position.

Another surveyed boundary whose wrong location can be seen on the map is the long north-and-south line that marks the western edge of Texas. This is supposedly the 103d meridian west of Greenwich, but it was marked on the ground nearly four miles too far west at the south end and about 2½ miles too far west at the north end.

The western boundary of Oklahoma is supposed to be in the same line. Its position shows approximately where the west line of Texas should be.

By contrast, the east boundary of the Texas panhandle, the 100th meridian west of Greenwich, is probably the most accurately determined State boundary in the United States. It was located geodetically in 1929.

"LONGITUDE WEST OF WASHINGTON"

A close observer will find half a dozen more north-and-south State boundaries in the West that lie a tiny distance west of the Greenwich meridian lines, and may assume that these indicate other errors. Instead, these boundaries are where they should be, at least approximately. They are the progeny of America's other longitude system, "longitude west of Washington," which for years was used on land instead of the Greenwich system.

Before cables had been laid or radios invented, time differences could not be indicated electrically, and of course distances could not be measured across the ocean. Astronomical observations gave results within a few seconds of arc, but this was still too approximate.

So the United States set up its own system, with the zero meridian running through the old Naval Observatory, west of the White House, in Washington. It happens that the 77th meridian west of Greenwich also runs through Washington. After cables connected England and America, in 1866, it was found that the 77th Greenwich longitude line runs along 5th Street East, approximately 2¾ miles east of the old Observatory.

Wherever State lines in the West were run according to Washington meridians, therefore, they fall just far enough west of the now universally used Greenwich lines for the discrepancy to be noticeable. In the latitude of the Mexican border west of Texas, the difference is about three miles. Along the Canadian border, it is approximately 2.3 miles.

A NETWORK OF SURVEYED LINES

As telegraph lines were extended westward they made possible the fixing of meridians, whether Washington or Greenwich, with greater accuracy. When electric time signals could at last be sent to the Pacific coast, in 1869, it was found that the tentative longitude lines there had been placed too far west.

The flash from a telegraph key, in effect, added to the map of the United States a strip of territory a half mile wide and 1,300 miles long that Uncle Sam did not know he possessed.

An invisible network of extreme importance covers the United States. It can be traced by its inconspicuous monuments set in the ground marking out careful measurements that have been extended by the United States Coast and Geodetic Survey east and west, north and south over the country. This network has been of inestimable value to map makers, enabling them to represent places in their true positions. The network was marked out independently of longitude positions while the surveys were being made and has been in effect as if a most accurate yardstick had been laboriously applied end to end across country.

The measurements have been more nearly accurate, however, than if they had been made with yardsticks or steel tapes, leaving room for errors at the many joinings of the ends. They have been made by the continued measurement of one base line until accuracy is insured, and then by the careful reading of angles from its ends to other stations and the calculation of the distances by trigonometry.

This system of triangulation, as it is called, is first laid down on the surface of the ground. But the distances desired are at sea level. The ideal would be that along a line connecting the Atlantic and the Pacific, for instance, a canal should

be dug and the distance measured along the water surface from ocean to ocean.

Geodetic surveyors have no magic steam shovels at their call to dig their "canals," but from the surface information they gather they burrow unerringly with trigonometry until their lines are reduced to a sea-level basis. Though the surveyors have only skimmed the surface, their triangulation system has been in effect laid down hundreds, and in some cases thousands, of feet underground.

The longitudes of places obtained by telegraphic and astronomical means do not exactly agree with their positions determined by triangulation. So long as the vertical is deflected, it is inevitable that such discrepancies shall occur. Recognizing this condition, the Coast and Geodetic Survey, after it had extended its triangulation across country, called intricate mathematical processes to its assistance and in effect shifted the rigid network of its measurements about over very slight distances until the errors in longitude and latitude of all the various stations were brought to a minimum. Then the network was "pegged down," so to speak, to serve for all time as the basic map-making and surveying skeleton of the country.

As a dominant point, the king-pin of the whole system, a station was established in north-central Kansas at Mead's Ranch, Osborne County. Although this point is to the multitude of lines and boundaries in the United States what Greenwich is to world longitude, it lies far from the beaten path, in a pasture, where perhaps not one in a hundred thousand Americans sees it.

This geodetic capital of America—"the primary station," geodesists call it—consists of a slab of concrete sunk into the ground until its top is flush with the surface. In it is set a bronze plate on which a cross-mark is engraved. On the tiny point where the lines cross hang the accurate surveys of a sixth of the world's surface, for both Canada and Mexico have adopted this point and its supporting system as "the North American Datum."

Photograph from International News

A RELIC OF THE MASON-DIXON LINE

The original markers of the boundary between Pennsylvania and Maryland were carved in England from limestone. On the Maryland side is the coat of arms of Lord Baltimore, and on the Pennsylvania side the arms of William Penn (see text, page 646).

NEW MAP REVEALS THE PROGRESS AND WONDERS OF OUR COUNTRY

ACCOMPANYING this issue of their Magazine, members of the National Geographic Society receive a new map of the United States and of adjoining portions of Canada and Mexico, which contains more place names and more information than any map yet issued of comparable, convenient size.

For nine months The Society's Cartographic Section has worked on the extensive research and drawing of this map, which includes also all of the Maritime Provinces and most of the industrially developed portion of Canada. To the south is northern Mexico to the Tropic of Cancer, and nearly the whole of the Bahama Islands. These areas of neighbor lands are shown with the same detail as the 48 States.

Mindful that members use their Society's maps constantly in their homes, offices, schools, and while traveling, the map makers were faced with the problem of presenting legibly a vast store of information on a sheet of a size which is convenient for desk use, for framing, or for consultation in automobile, train, or airplane.

A MAP CONDENSES VOLUMES OF FACTS

A map is the shorthand of geography. Literally hundreds of surveys, scores of volumes of statistics and other data, and extensive correspondence with surveying and mapping agencies in every State of the Union have been consulted and condensed on this chart.

There are 8,686 place names on the map.

To show so many names on a sheet of this size, 40½ x 26½ inches, a new process of map lettering was designed by Albert H. Bumstead and perfected by The Society's Cartographic Section and its Photographic Laboratories, especially for use on the United States Map.

By this process the names were reproduced photographically from hand-drawn alphabets of different styles. These alphabets were designed by The Society's cartographers to give clear legibility to the map reader even in areas of close crowding, such as New England. Thus the map combines the advantages of hand-drawn letters with the perfect uniformity of lettering done by type.

To the reader who scans the United States Map with imagination,* and compares it with The Society's Map of the United States issued in 1923, the romance, the progress, the swift changes in our country leap to mind. These are apparent in virtually every State.

Larger type sizes show how scores of towns and cities have passed from one population group to another. New and populous communities emerge for the first time on a national map.

America's demand for automobiles brought Dearborn, Michigan, from an obscure town of 2,470 people in 1920 to a thriving city of more than 50,000 souls in the 1930 census figures, while oil wells raised Seminole, Oklahoma, from a village of some 800 people in 1920 to a community of 11,459 in 1930.

Longview, Washington, did not appear in the 1920 census; in 1930 it had more than 10,000 people. Aliquippa, new Pennsylvania steel city, jumped from fewer than 3,000 population to more than 27,000 in that decade.

Other places are located on the map not because of size, but from historic, industrial, or popular interest.

Mount Vernon, Virginia, home of George Washington, and St. Marys, Maryland, first settlement of Lord Baltimore, are shown. Also marked are a new national shrine, tiny Plymouth, Vermont, boyhood home of Calvin Coolidge, and Cowpens, South Carolina, scene of a decisive battle of the American Revolution.

Then there are Hollywood, California, motion-picture capital; Attapulgus, Georgia, famous for its fuller's earth industry; Climax, Colorado, which yields 80 per cent of the world's supply of molybdenum, and Santa Claus, Indiana, where thousands of Christmas greetings are postmarked each year.

NEW LAKES, PARKS, AND DAMS

Vast engineering projects constantly change Nature's surface. On the new map appear the site of the Hoover Dam, a number of new artificial lakes and reservoirs, such as Pymatuning Reservoir, in Penn-

*See "Geography and Some Explorers," by Joseph Conrad, in the NATIONAL GEOGRAPHIC MAGAZINE for March, 1924.

Photograph by Richard H. Stewart

A SECTION OF THE MAP DEPARTMENT OF THE NATIONAL GEOGRAPHIC SOCIETY

Months of surveys, research and correspondence, and careful checking with all sources of information already recorded, precede the actual drawings for the plates which are used in printing the copies of the finished maps received by members (see text, page 652).

sylvania and Ohio; Lake Norwood, North Carolina; Lake of the Ozarks, Missouri; and Agua Fria Reservoir, Arizona.

National parks and national monuments are shown, including the new Mammoth Cave project (Kentucky), the Grand Canyon (Arizona), the White Sands (New Mexico), and the Death Valley (California) national monuments. The latter two were set aside by presidential proclamation within the current year.

The Mexican portion of the map shows the new divisions of Baja, or Lower, California and their capitals, Mexicali and La Paz.

The first step in planning a map is the choice of a projection, that is, a grid or network of lines representing the meridians of longitude and parallels of latitude on the area. Since, in reality, these lines are wrapped about a spherical surface, it is impossible to represent them on the flat surface of a sheet of paper without stretching some lines, shrinking others, or distorting the shapes of the meshes they form.

Map makers have devised many ways of minimizing these distortions. Each of these systems is known as a projection. Thus there is the classic "Mercator projection," and many of later date, such as the "Polyconic (or many-coned) projection," upon which, until very recently, most maps of the United States were drawn.

The Society's new Map of the United States is drawn upon a projection technically known as the "Albers equal area conic projection, with two standard parallels." This projection has the advantage that any area may be computed with accuracy, and any distance may be measured with an average scale error of less than one-half of one per cent, as against a possible seven per cent error in both area and scale on the older projection.

HIGHEST ELEVATIONS IN ALL BUT TWO STATES

Some 200 mountain ranges and peaks are delineated, and more elevations are given (in feet above mean sea level) than have heretofore been shown on any map of comparable size.

The highest elevation in each State is recorded, with the exception of Rhode

Island and of Missouri, where incomplete surveys leave this fact undetermined.

Mount Shasta and Lassen Peak, in California, are not regarded by geographers as being parts of the Sierra Nevada, as they usually have been represented, and they are indicated as separate peaks on this map. The Green Mountains of Vermont and the White Mountains of New Hampshire are shown as parts of the Appalachian Mountains.

Highways, printed in red, show main interstate and through routes within the States. In selecting these trunk lines of motor travel The Society had the coöperation of highway officials of each State, and of Canada and Mexico. Members planning long motor trips may rely upon finding the best through roads marked on the map; for details of side roads, State or local maps may be consulted.

Major interstate railway routes, over which run through trains for long-distance passenger travel, are drawn in black.

Rivers are printed in blue. Printing the rivers in blue instead of in black is a unique feature of NATIONAL GEOGRAPHIC maps. By the use of this color the course of the magnificent river systems of the United States can be easily followed on the map.

"HOW DO YOU SPELL IT?"

In many homes, offices, and schools it is believed the map will be a constant source of reference for authoritative spelling of place names. Within the last few years thousands of rulings, many upon disputed spellings, have been made by the United States Geographic Board. The maps of the United States Geological Survey and the reports of the United States Bureau of the Census afford other checks upon place-name spellings.

For example, the Kootenay River is correctly spelled with the final "y" in Canada, where it rises, but when it flows across the United States border it officially becomes the Kootenai. Both spellings are shown.

A long-standing dispute over the spelling of New Hampshire's largest lake was settled by a ruling in February, 1933, which substitutes an "i" for the "e" which formerly followed the double "n" of Winnipesaukee. The presses were stopped during printing to make this change.

When the map maker has completed his task, the lithographer must plan to print more than one million copies of the map,* that each of The Society's members may have a perfect copy.

PRINTING A MILLION COPIES

Four drawings, each to a hair-line accuracy, so that one may be superimposed upon the other, were made for the Map of the United States.

One, printed in black, showed lettering, boundaries, city and town spots, lines of latitude and longitude, and railways. The second, printed in red, showed highways. The third, printed in blue, recorded shore lines and rivers; and the fourth, printed in olive gray, showed the mountains by means of delicate, etchinglike hachures, which are the short lines used for shading and denoting the relief of the ground.

Other plates were made by the lithographer for printing the tints indicating water areas and the political divisions.

Each map represents six press impressions. Though there are but six inks used, the various combinations of these inks give ten colors, including black. Each State is given a color of its own, which clearly sets it off from its neighbors; pink is used for Canada and other British territory, and the Mexican States are shown in yellow.

The Society believes the issuance of the Map of the United States will be of exceptional interest at this season to many members who will take vacations in the United States and Canada because of the opening of new National and State reservations, increased facilities for motor touring, lowered summer railroad rates, and the extension of aërial travel routes.

It adds another important map to the series of World Areas and the Map of the World which members received with their GEOGRAPHIC MAGAZINE of December, 1932. To members wishing to complete their repertory of The Society's maps, The Society will be glad to send, upon application, a list of maps and other publications which may be had separately at revised prices.

*Members may obtain additional copies of The Map of the United States on paper for 50 cents; on map linen, 75 cents. The Index of all names on The Map may be had for 25 cents.

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TO carry out the purposes for which it was founded forty-five 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.

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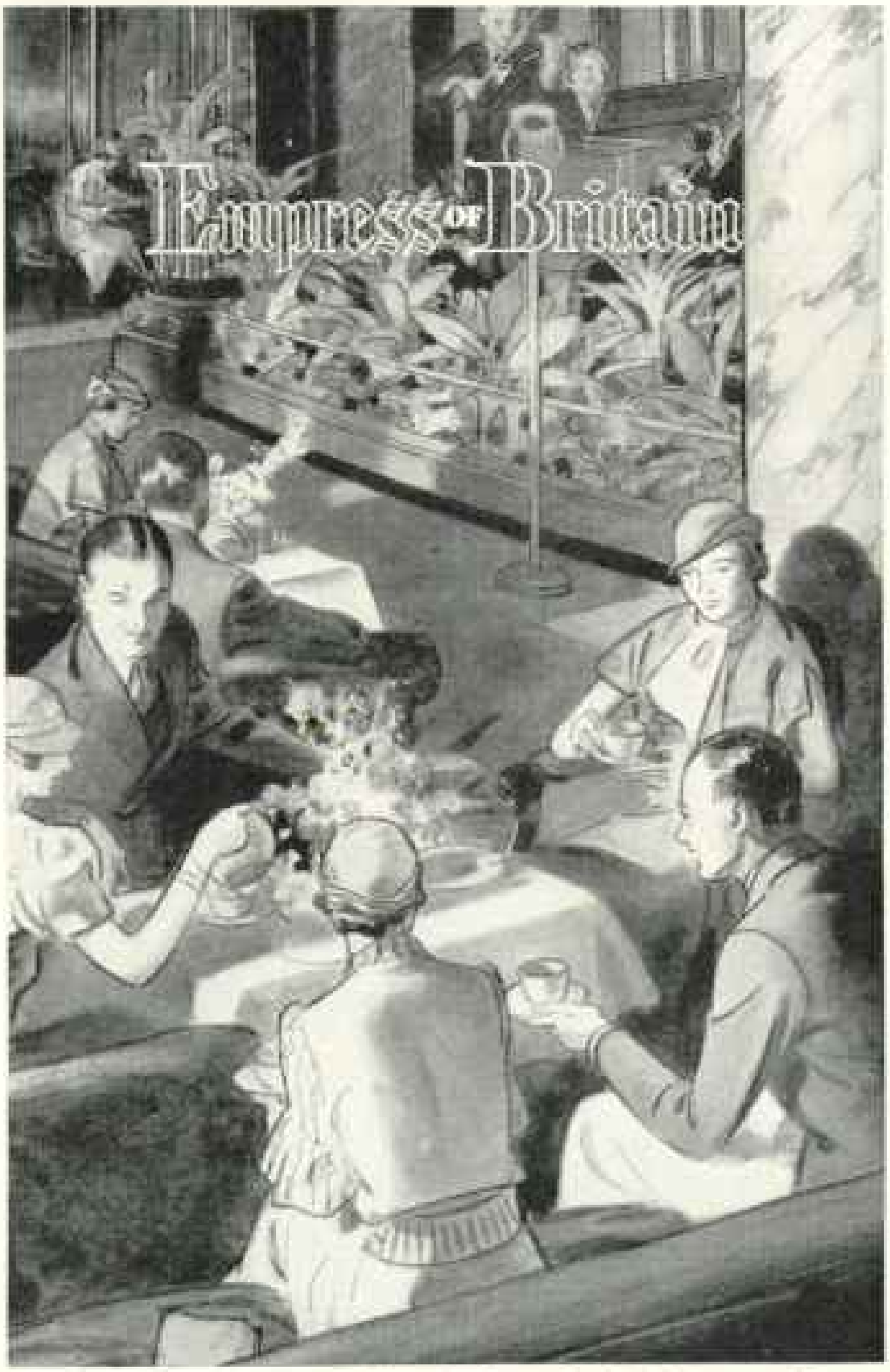

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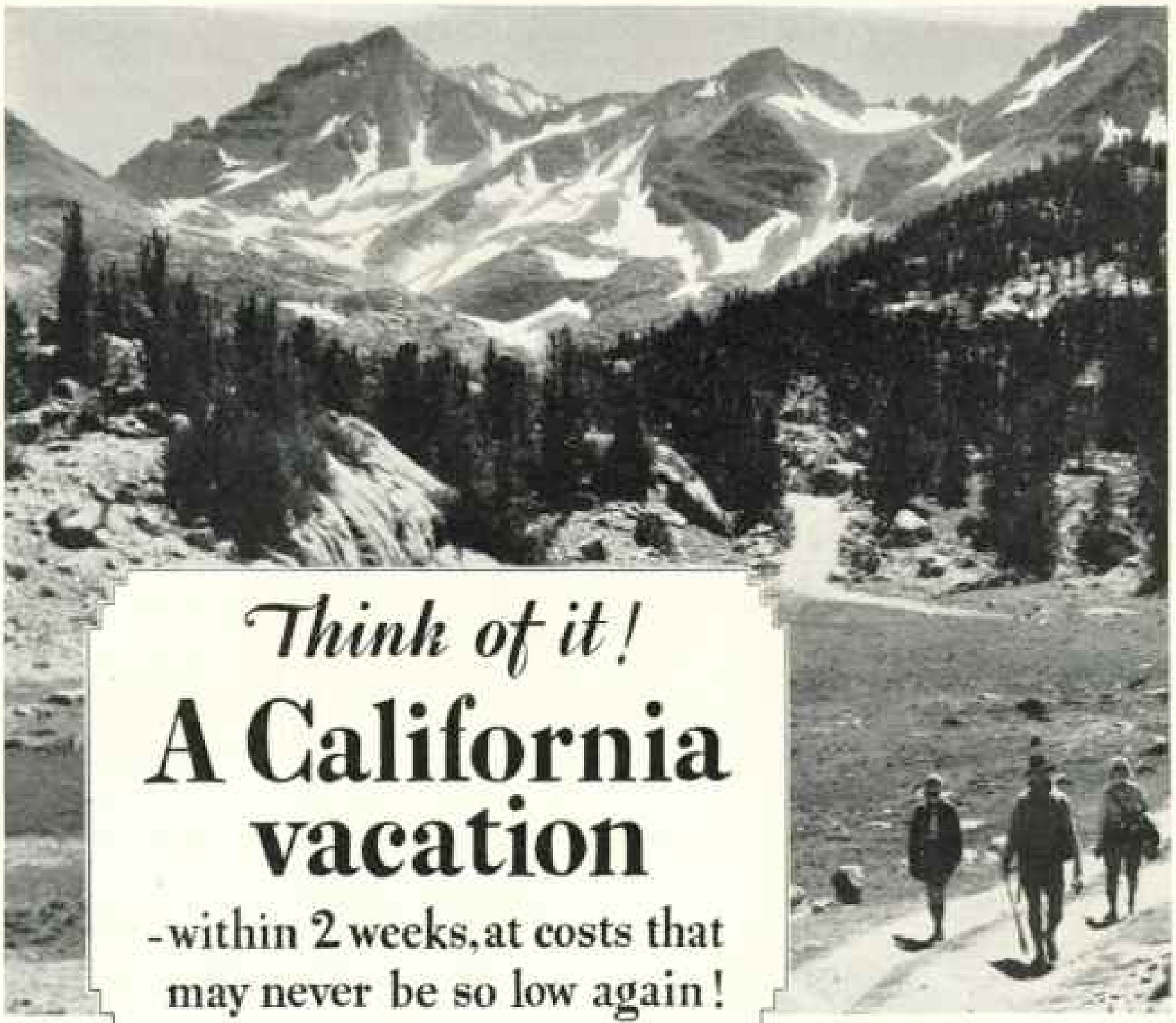

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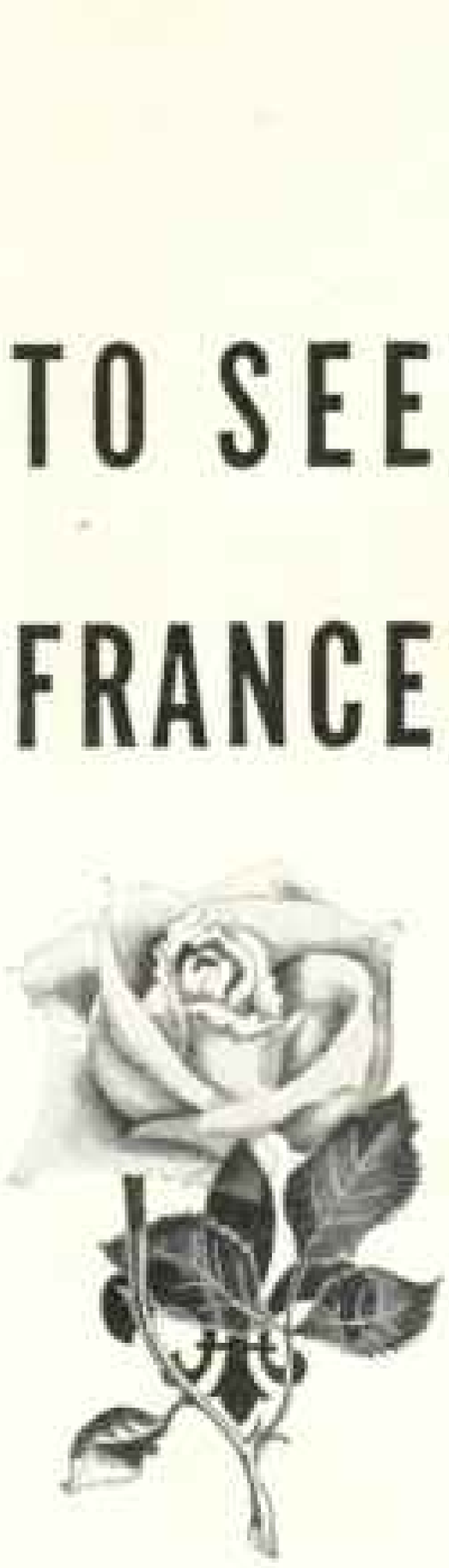

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IS EVERY WOMAN'S RIGHT

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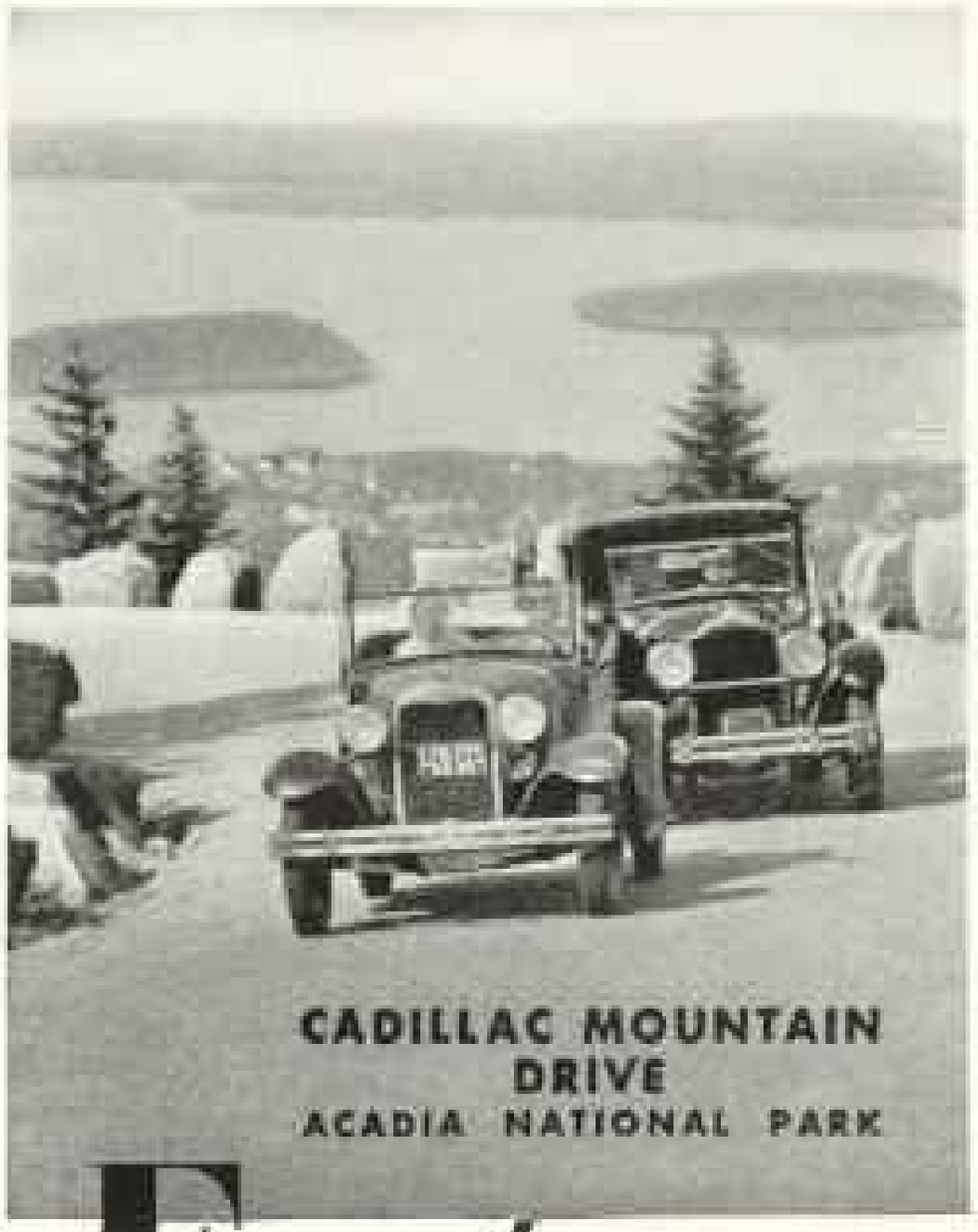

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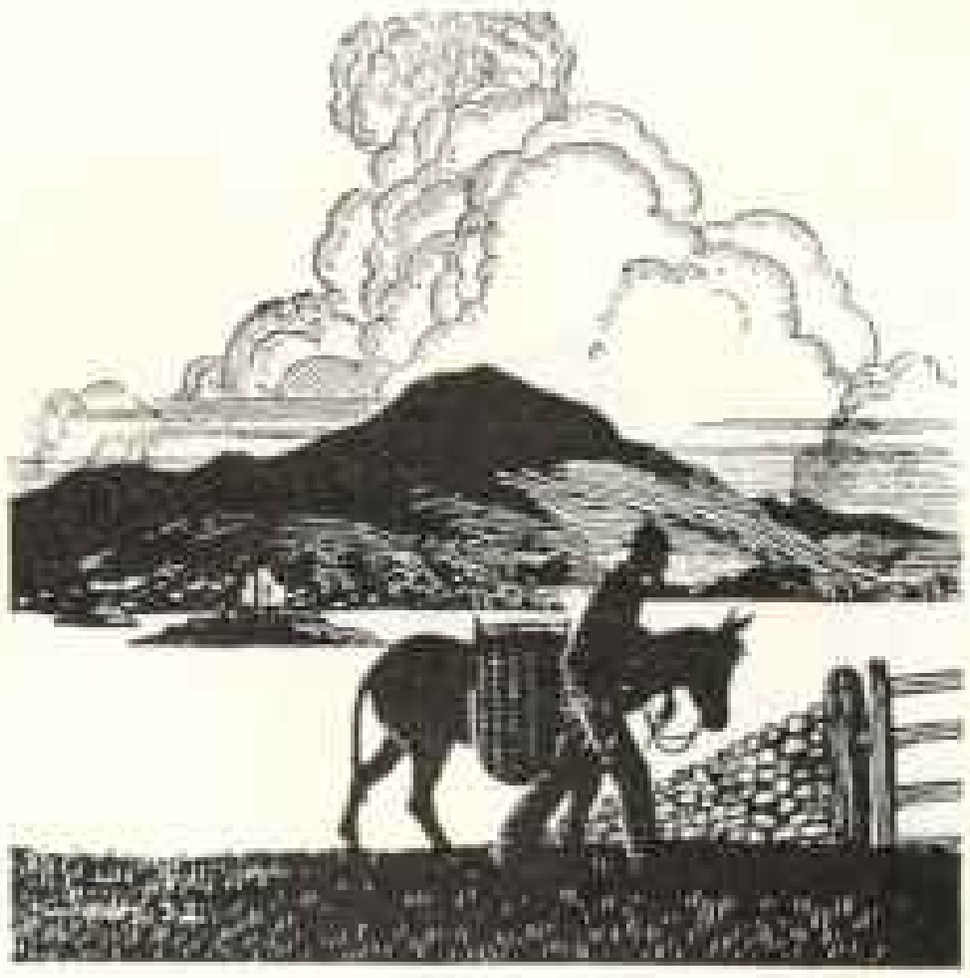

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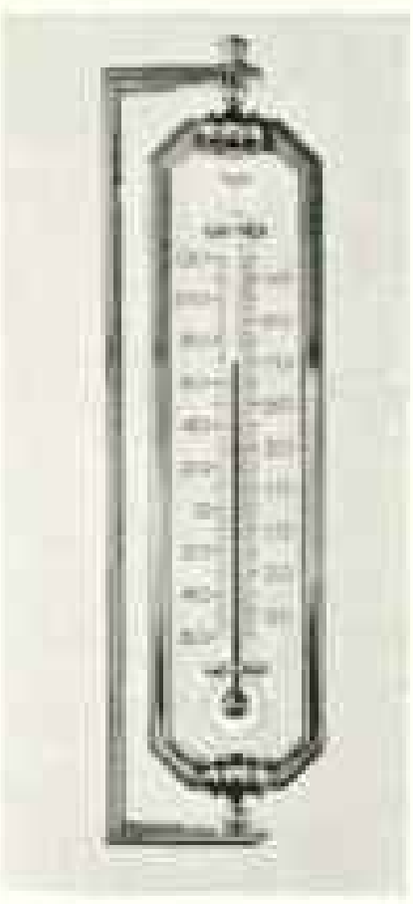

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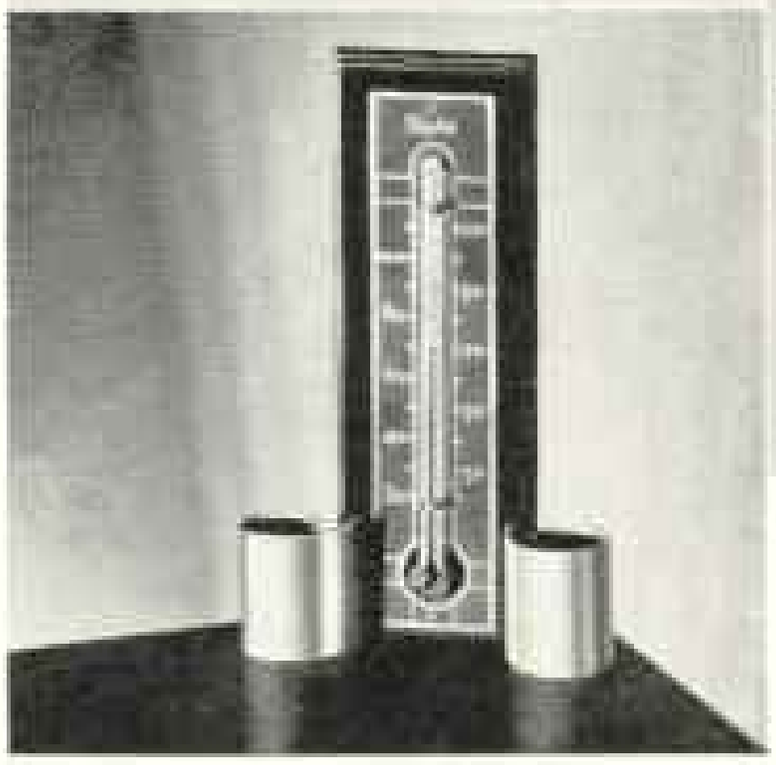

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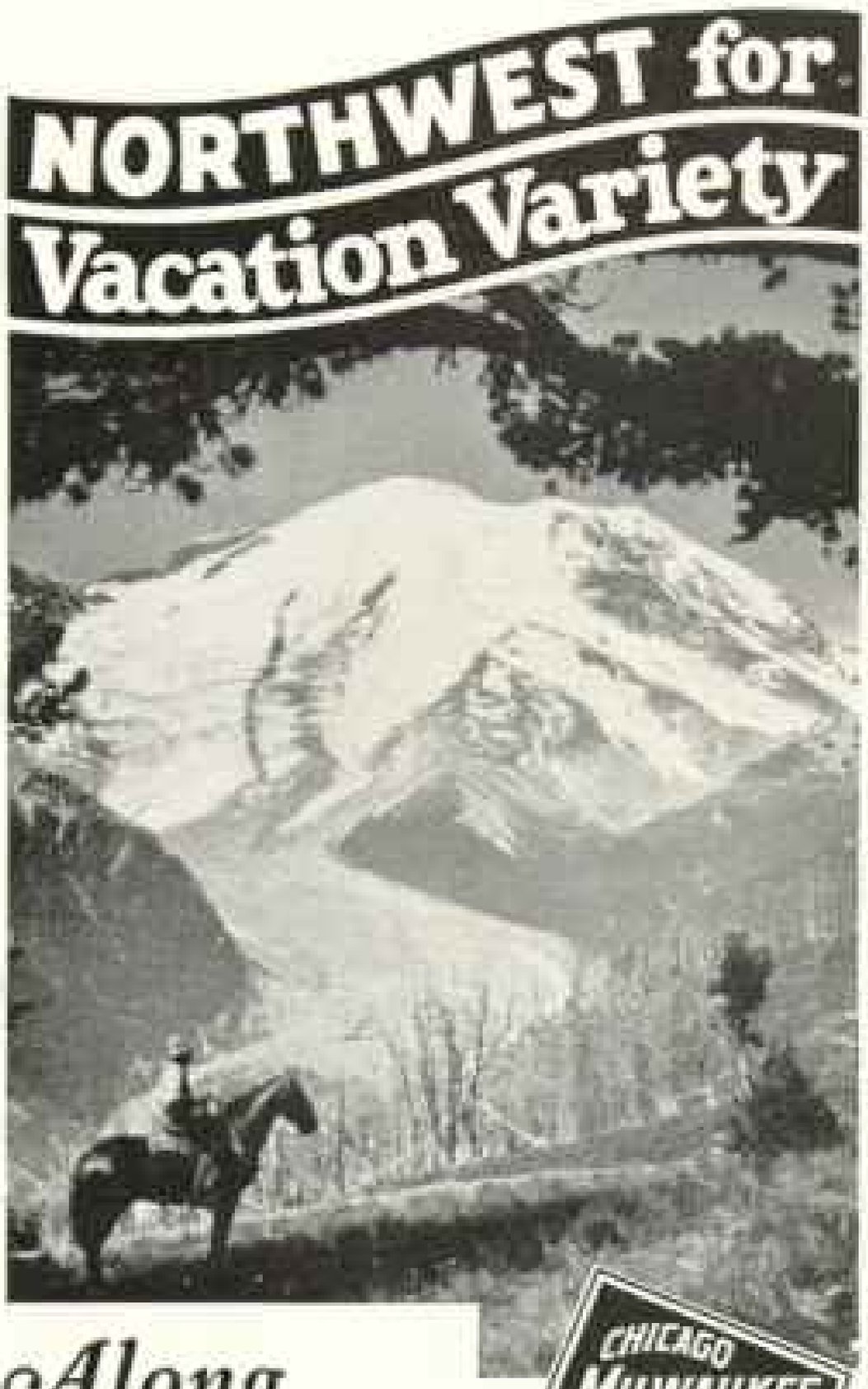

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I am thinking of vacationing as I have checked above. Please send illustrated folders and information. 386-6

Name .....

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We couldn't remember···What we came to Forget

Fort De Russy's gun salutes the sunset. Five o'clock on Oahu. The sun drops down for its dip in the southern sea. A moon rises behind Diamond Head. Purple shadows begin to tint the sea about us.

Five o'clock now . . . dinner at eight. Time for one more flight down white waveless. Then a shower, tingling against sun-warmed skin. Dressing leisurely with the sounds of tinkling glasses and laughter coming from a nearby lanai. . . . Outside the window, dusk. Waikiki's lights twinkling to the early stars, and away on the coral reef the puff of white surf, the mystic flare of torches where natives fish with spears.

Here surely is the place where you can forget! Forget . . . Forget what? We can't remember . . . It doesn't matter.

$220 Roundtrip

The finest, fastest ships that sail from the Pacific Coast ports of Los Angeles, San Francisco and Vancouver will carry you to Hawaii and back for $220, First Class. Comfortable and spacious Cabin Class accommodations, $150 roundtrip. A railway or travel agent in your own hometown can arrange your trip.

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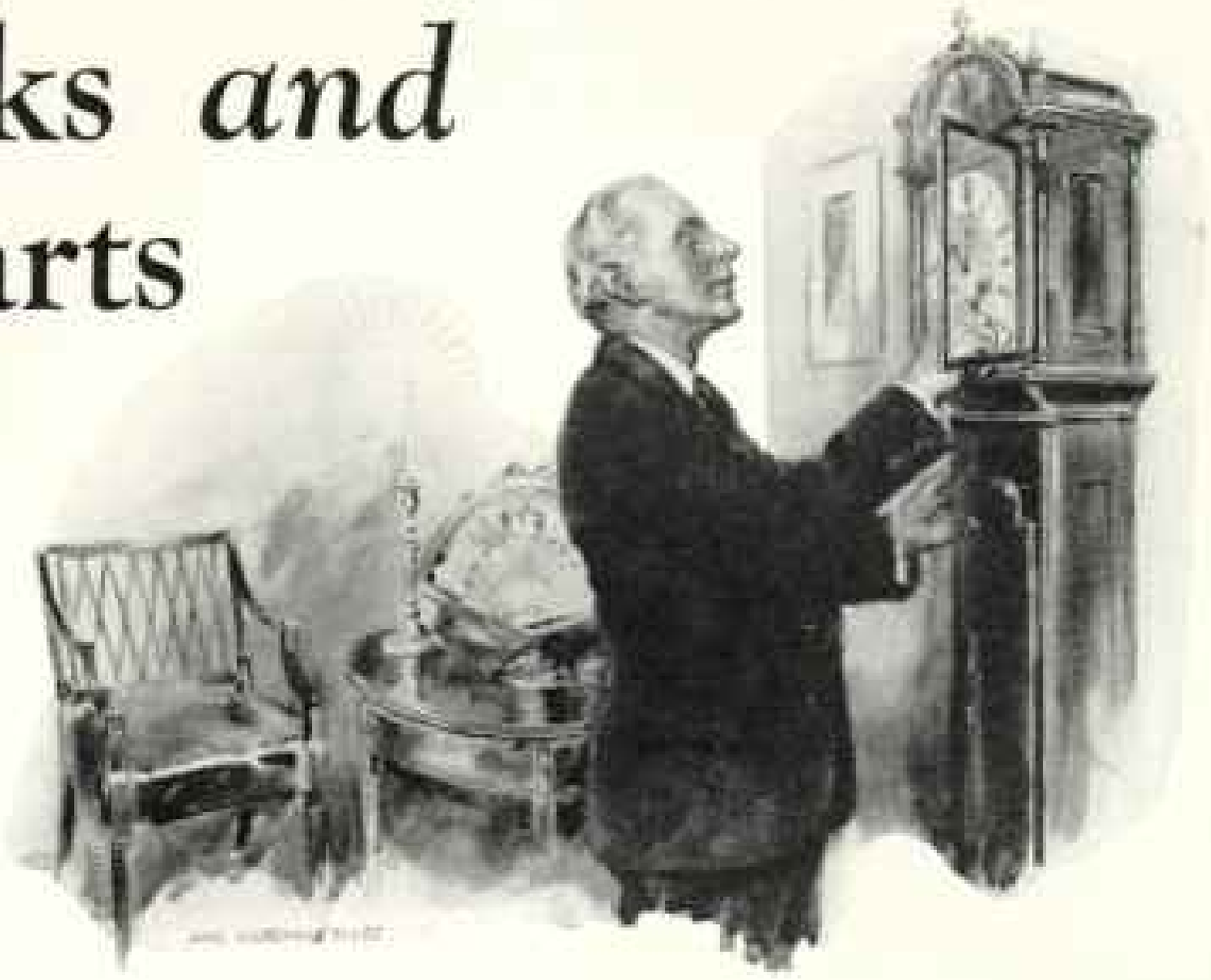
Clocks *and* Hearts

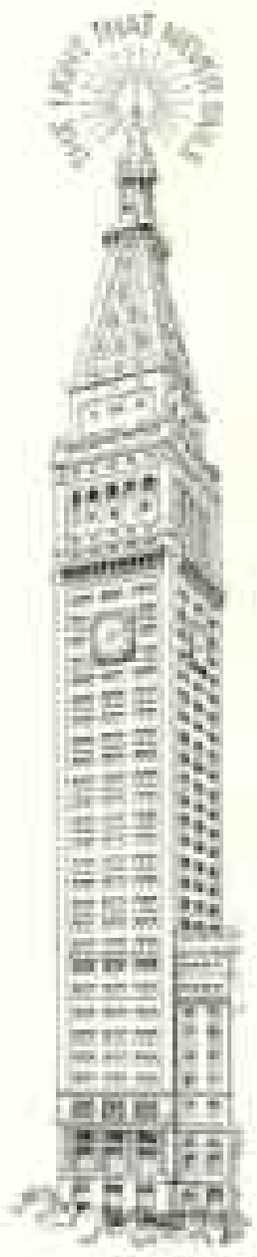


When you look at a beautiful clock which has kept almost perfect time for nearly a hundred years, you marvel at the skill of its maker.

However, it could not have kept ticking 31,536,000 times a year if it had not been regularly inspected and kept in good repair during its long life.

But far more remarkable than the old clock is the engine made for you by Nature, which pumps faster than the clock ticks—your own heart which has throbbed more than 35,000,000 times a year with no stopping for repairs. Your very life depends upon its continuing ability to pump blood to all parts of your body.

Do you take good care of your heart? It will serve you longer, make you happier, make your life more worth living if you do not abuse it and if you do not neglect it in case it beats too fast or too slow, too faintly or too violently.



A man with a bad heart—*who has learned how to take care of it*—frequently outlives men who persistently abuse their hearts. Some of the most efficient and useful people in the world have had heart trouble for years.

In sharp contrast to people who have real heart ailments are the many persons who worry about imaginary heart trouble. Indigestion, lung trouble or nervousness may cause symptoms near the heart, while the heart itself is entirely sound.

If you would keep your heart beating contentedly, like Grandfather's clock—seventy, eighty or perhaps a hundred years—give it attention—at least an annual examination by a competent doctor. He will tell you what to do if it needs help or special care. The Metropolitan will be glad to send you its free booklet, "Give Your Heart a Chance." Address Booklet Department 533-N.

Too prolonged overstrain at any age in life may cause heart trouble. There are, however, three general groups of heart difficulties:

FIRST—the heart troubles of young people caused by diseases of childhood. Rheumatic fever and rheumatism (associated with "growing pains," tonsillitis and stiff and painful joints) frequently cause heart disease. Diphtheria, scarlet fever and measles may injure children's hearts.

SECOND—heart diseases of middle-aged people resulting from syphilis, toxic poisoning, or focal infection in teeth, tonsils, sinuses and elsewhere.

THIRD—heart ailments of old people which may result from one of these definite causes or from hardening of the arteries.

Many people whose hearts have been damaged are adding years to their lives by hygienic living, rest and intelligently balanced exercise.

METROPOLITAN LIFE INSURANCE COMPANY

FREDERICK H. ECKER, PRESIDENT — ONE MADISON AVE., NEW YORK, N. Y.

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The glorious tone quality of the PHILCO Inclined Sounding Board brings every artist into your home as if "in person".

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(Patented)

The Inclined Sounding Board preserves for you the sparkle and brilliance of the original performance. Brilliance lies in the high notes. High notes tend to travel in a straight line like a beam of light. Inclining the sounding board throws them up to your ears. Otherwise some of them would travel along the floor, never spread up to your ears, and you would receive something less brilliant than the original.

The large size of the Sounding Board brings you the low notes. Low notes spread out easily and it is not necessary to incline the sounding board to bring them up to your ears. But without inclining the sounding board, you would get a preponderance of lows and the reception would tend to sound "boomy".

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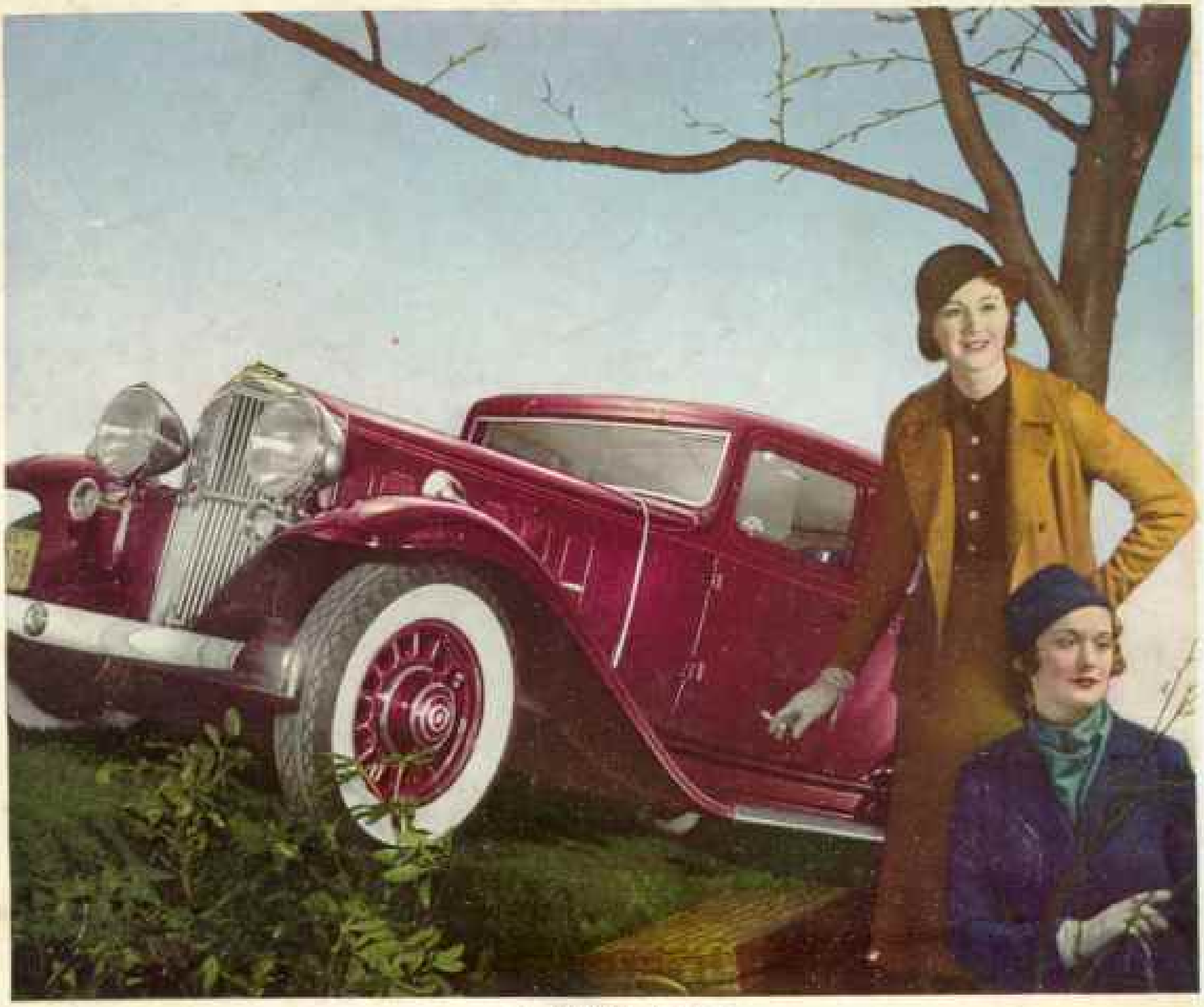

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NASH

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116-inch Wheelbase	*116-inch Wheelbase*	*121-inch Wheelbase*	*126-inch Wheelbase*	*133 and 142-inch Wheelbases*
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Old-fashioned vegetable soup ... *with tempting pieces of meat!*

There are often times when your appetite delights in a vegetable soup that also contains nourishing pieces of meat — so welcome when you are extra-hungry. At such times, Campbell's Vegetable-Beef Soup is the perfect choice. No other soup in America has sprung into such sudden and growing popularity!

In Campbell's Vegetable-Beef Soup are luscious red-ripe tomatoes, diced potatoes and carrots, peas, onion, selected barley, beef broth, vegetable puree —and pieces of beef in generous quantity. A meal in itself! So nourishing and so convenient!

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21 kinds to choose from...

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Bean
Beef
Bouillon
Celery
Chicken
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Clam Chowder
Consommé
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Mock Turtle
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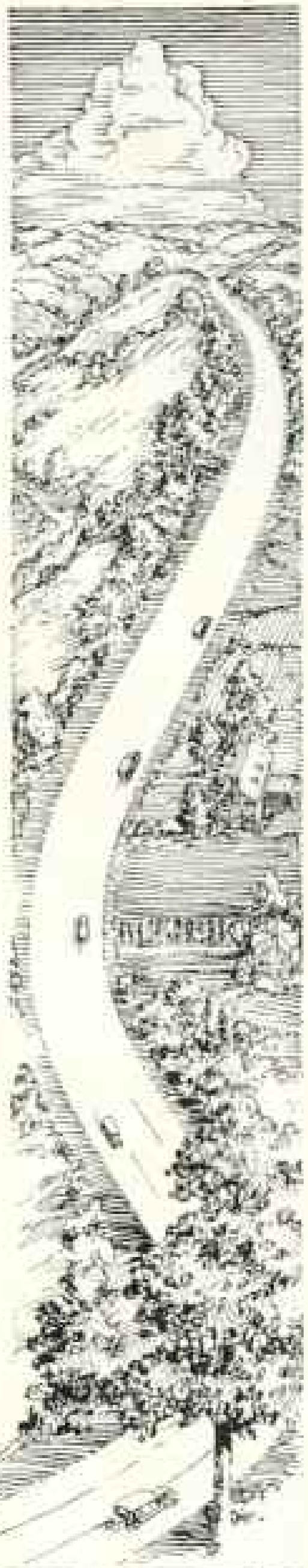
10 cents a can

LOOK FOR THE RED-AND-WHITE LABEL

YOU WILL FIND THE NE PLUS ULTRA OF MOTORING JOY IN THE FAMOUS SHENANDOAH VALLEY OF VIRGINIA AND ITS BEAUTIFUL MOUNTAINS INCLUDING THE SHENANDOAH NATIONAL PARK AREA



SPRINGTIME is here. Virginia's famous Garden Week has started the flow of the tourist tide. The azaleas, rhododendrons, and laurels are taking the places of redbuds and dogwoods. The famous Apple Blossom Festival at Winchester is upon us. The beautiful Shenandoah Valley is donning its most gorgeous robes for the vernal season.

From the East and the West, from the North and the South, delightful highways are ready to bring you into this greatest wonderland of Eastern America. From Washington, a mighty Nation's glorious Mecca, one can reach the heart of the Shenandoah National Park area, and as soon as it is open, the great 40-mile Skyline Drive. The lovely Valley and its resplendent Park area are only a day's motor journey or less from forty million people.

From the Potomac to the Roanoke the Valley constitutes one unending yet ever-changing scene of mountain-walled loveliness.

History has given the great Shenandoah Valley a golden glamour. Man has cultivated this modern Garden of Eden until it has become a 200-mile mosaic set in an azure frame.

In the Luray Caverns, the Endless Caverns, and the Grand Caverns you will find the world's masterpieces in subterranean architecture. Neither castles in Spain, cathedrals in England, temples in India nor palaces in China can rival the exquisite artistry of these Creator-built fairy lands.

The Natural Bridge, marvel of all Nature, before which prehistoric Indian and such men as Jefferson, Marshall and Henry Clay have stood in awed and reverent silence, has, through the miracle of electrical reproduction, become the singing rocks, reverberating with the greatest peans of the ages.

Visit the Shenandoah Valley and its unrivaled Shenandoah National Park area in 1933. They offer you the supreme in vacation joy and mark the perfect route between the North and Dixie. For descriptive booklets and detailed information, address

Shenandoah Valley

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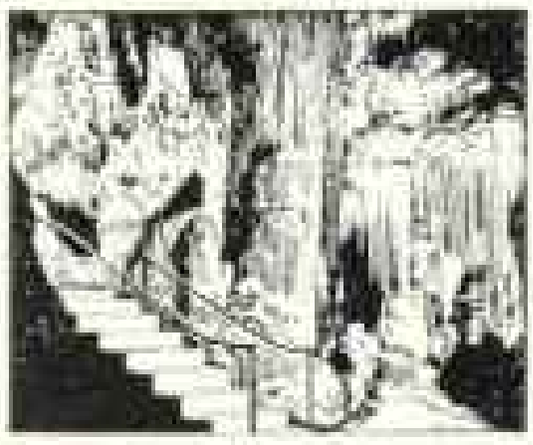
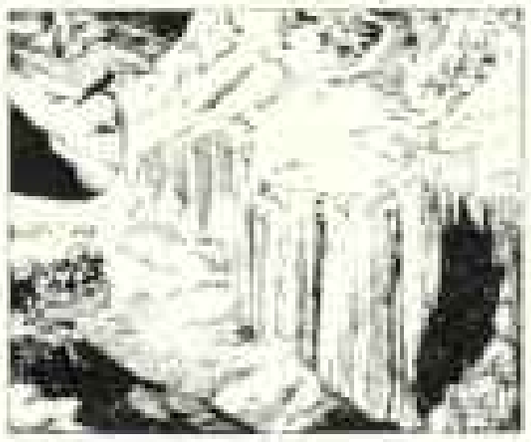
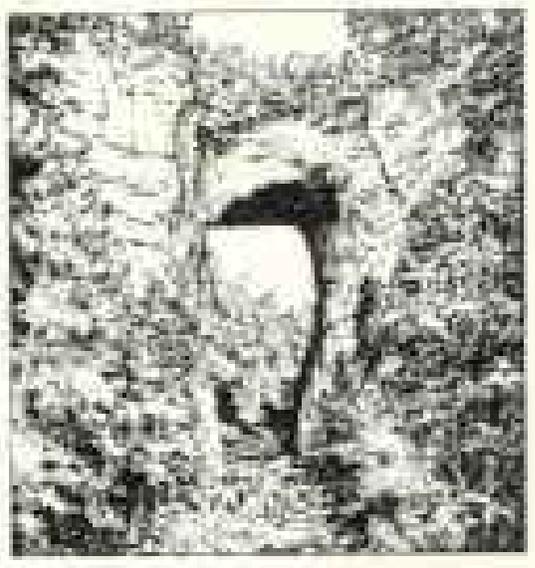


Titania's Veil and Saracen's Tent in the Beautiful Caverns of Luray.



The Snowdrift, one of the rare formations in the famous Endless Caverns at New Market.

The Lindbergh Bridge, one of a multitude of noble formations in Grand Caverns, which include the historic Weyer's Cave.



The historic Natural Bridge with its sublime music and pageantry has stirred the souls of millions of visitors.

"I'll call you up!"

A HUSBAND bids his wife good-bye as he leaves in the morning. "I'll call you up," he says reassuringly. A guest leaves after a pleasant week-end. "I'll call you up," she tells her hostess. An executive sits at his desk handling varied business matters, large and small. "I'll call you up," he says.

"I'll call you up" is a phrase that has become part of our language and part of our modern security. It is a phrase of confidence and a phrase of friendship. Implied in it is a nearness to everything and everybody.

The familiar gesture of lifting the telephone receiver holds boundless possibilities. It may avert a danger, end an anxiety, solve a dilemma, insure an order. Or it may be for some trivial pleasant purpose —a jest to be shared, a greeting to be spoken.

Over the telephone speed the thoughts and ideas that change destiny, bring new hope to the wondering and greater achievement to the ambitious.

Think what this world would be like if you could not telephone so easily to so many people. No one is far away when you can say—"I'll call you up."

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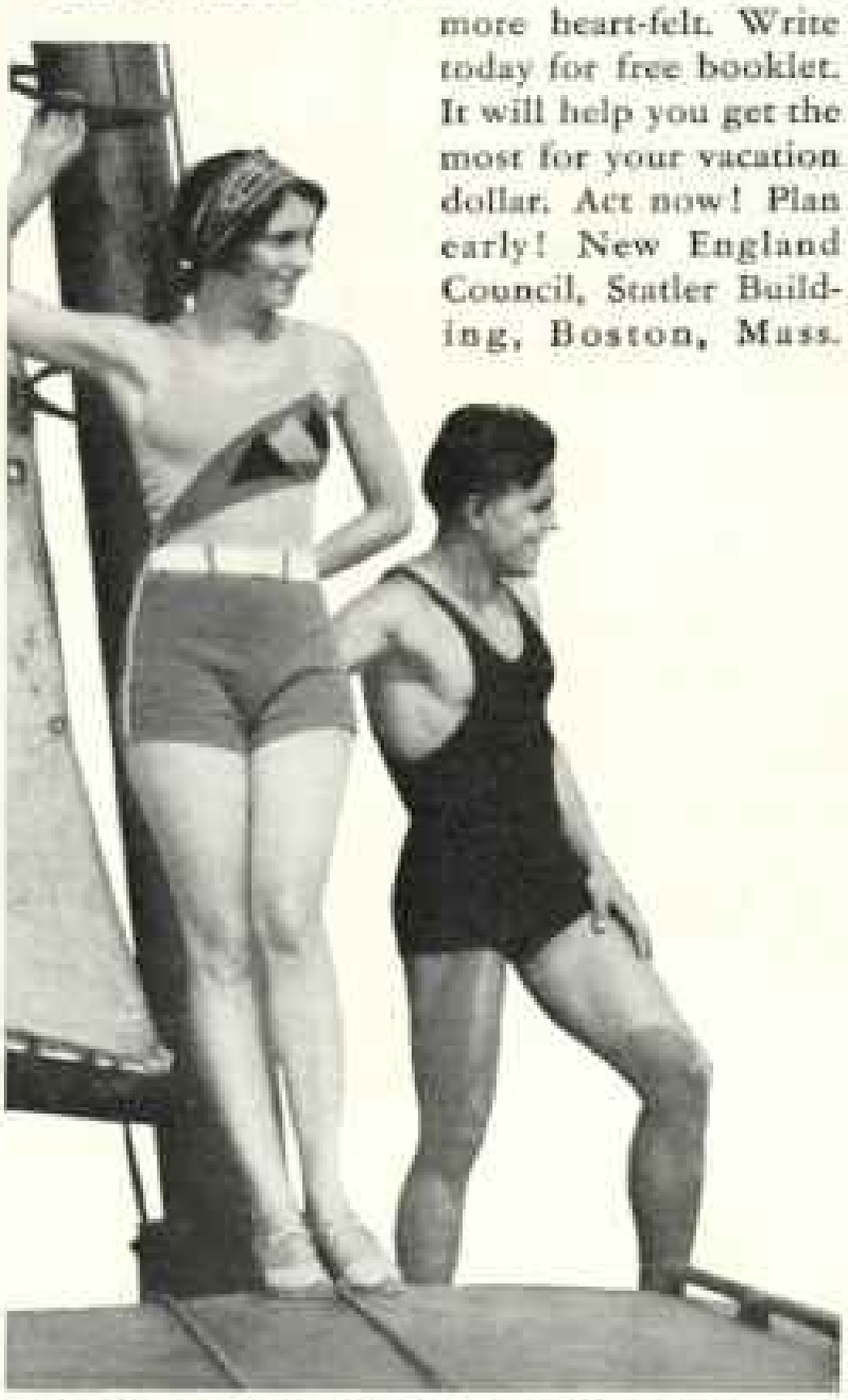

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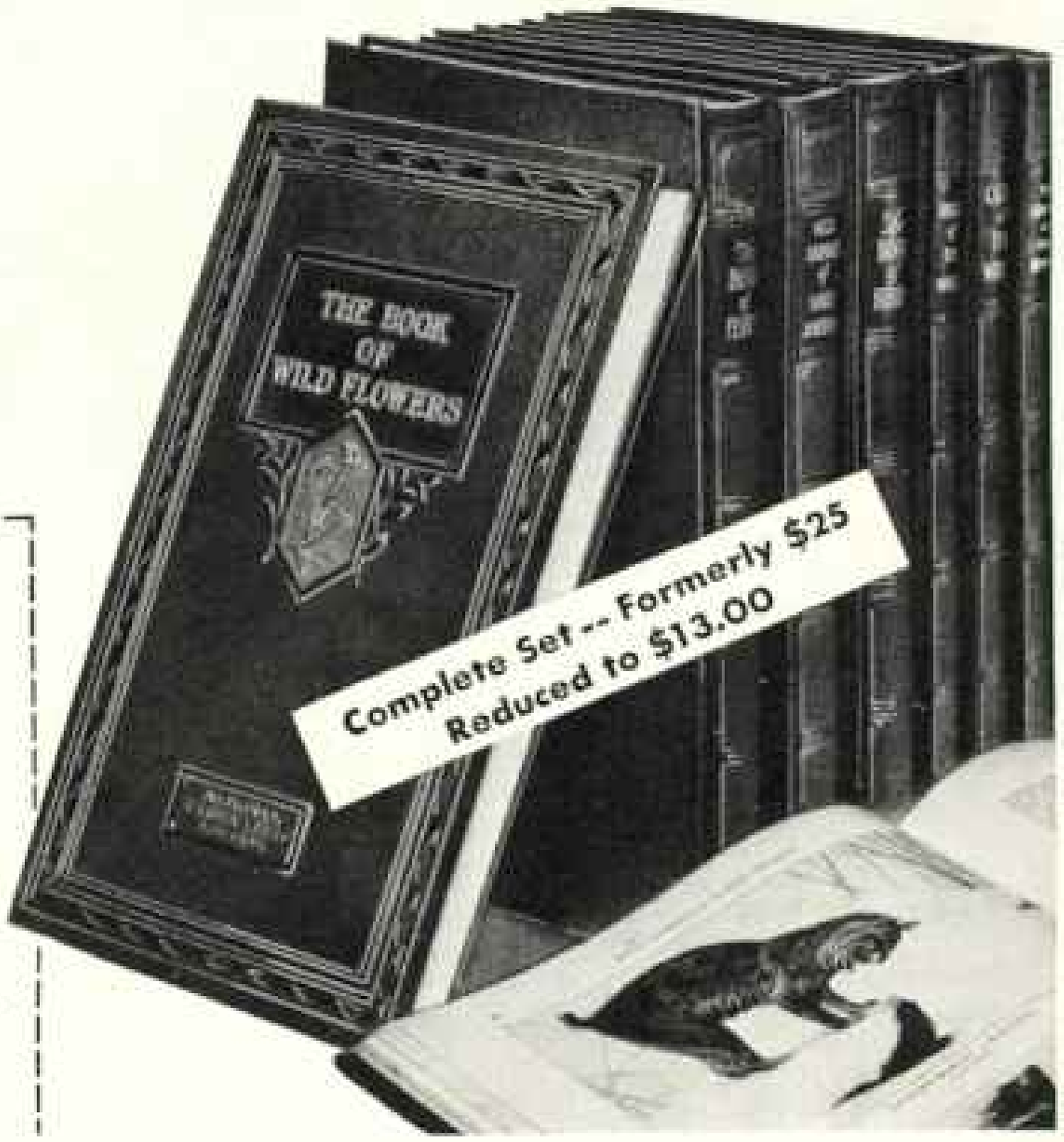

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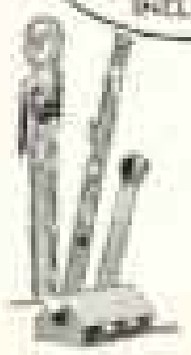

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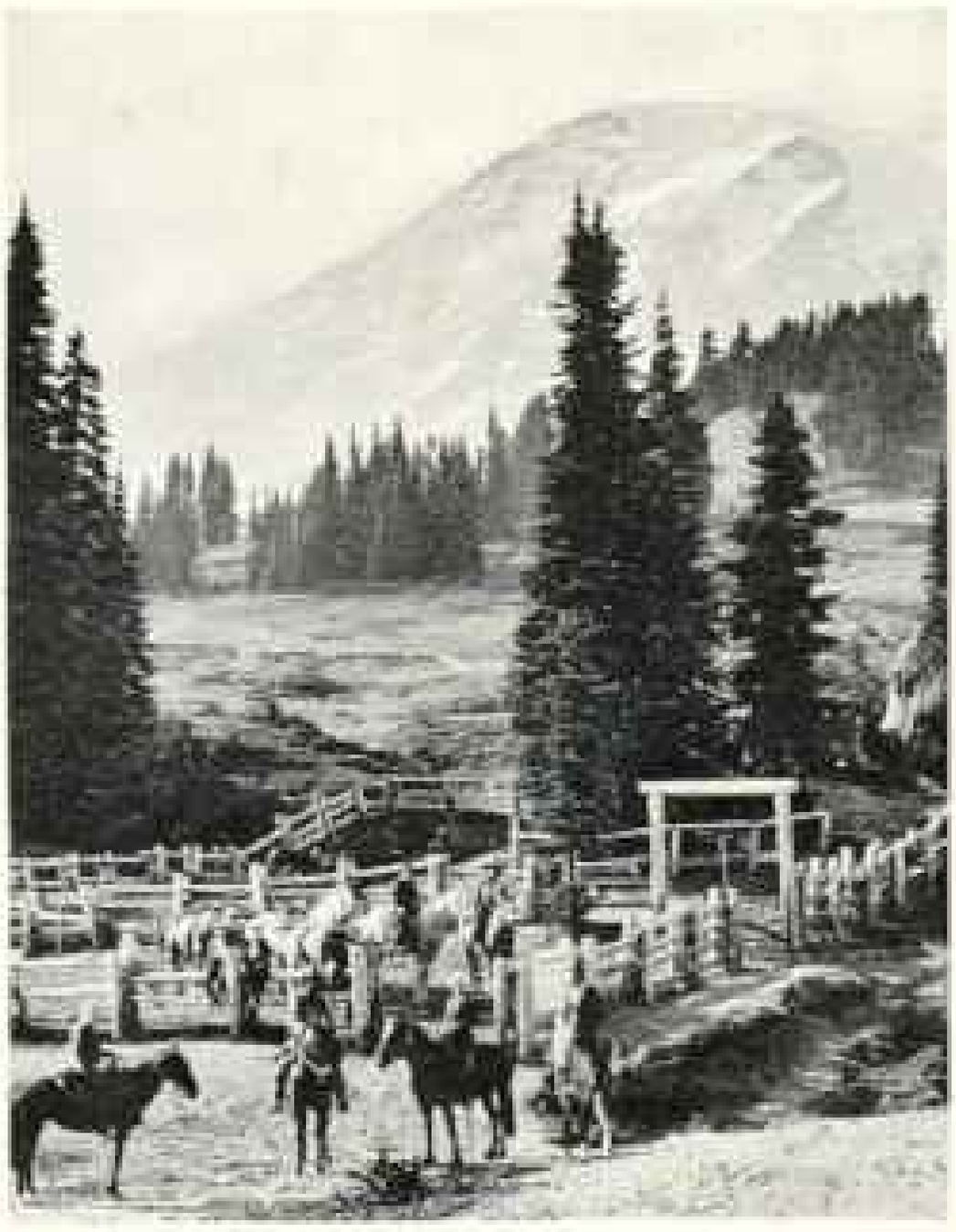

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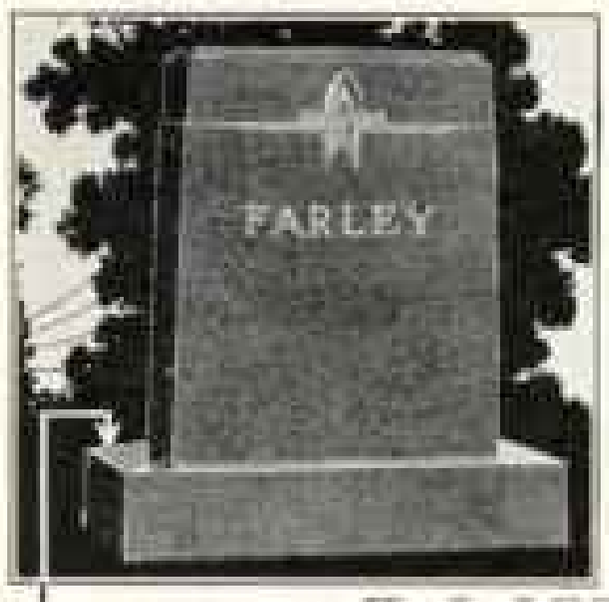

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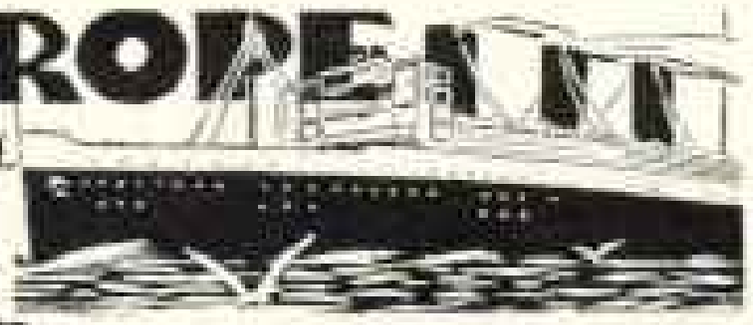

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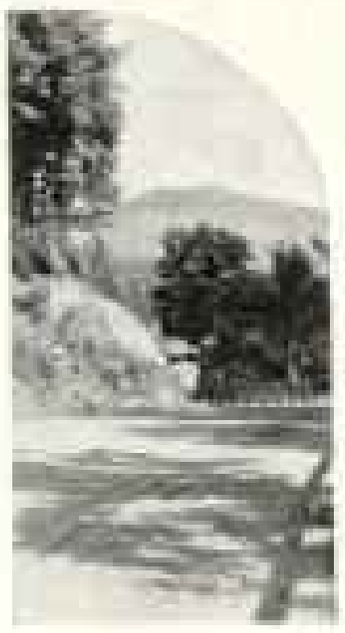

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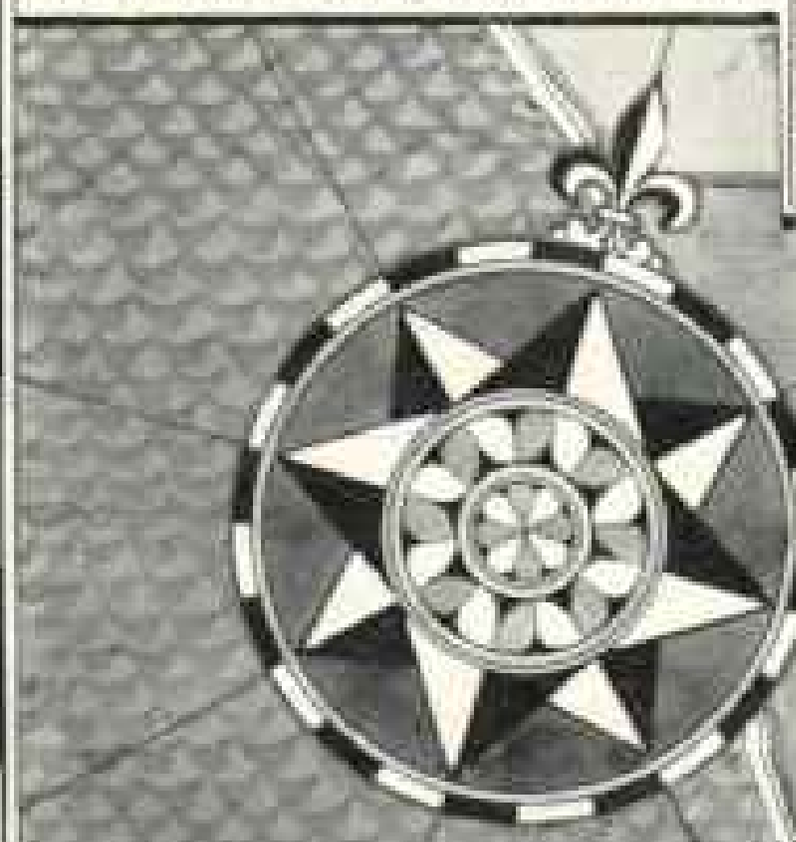

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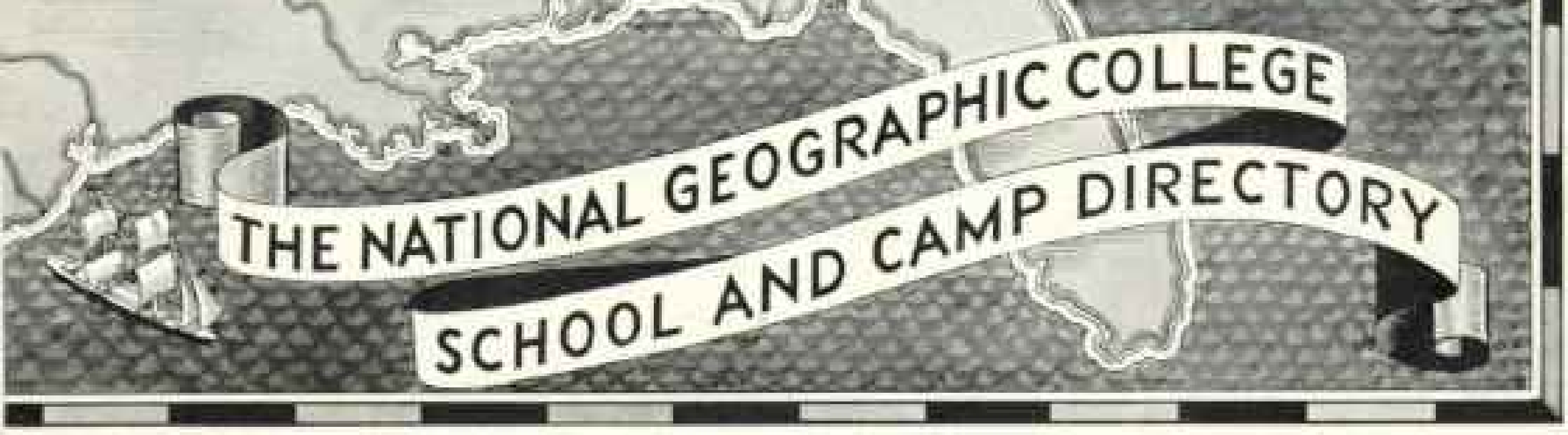

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