VOLUME LXXXVIII NUMBER TWO

THE NATIONAL GEOGRAPHIC MAGAZINE

AUGUST, 1945

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

$4.00 A YEAR 50c THE COPY

VOL. LXXXVIII, No. 2 WASHINGTON AUGUST, 1945

THE NATIONAL GEOGRAPHIC MAGAZINE

London Wins the Battle

BY MARQUIS W. CHILDS

THE roar you heard when a V-2 fell was like a clap of distant thunder. If it was close enough, say three or four miles away, the windows rattled; and closer still the house shook as though a giant hand had joggled it. What happened when it dropped near by you never knew because you were either dead or unconscious.

That was during the final phase of the battle for London. The city had come through the blitz of 1940-41.*

It stood up under the barrage of V-1's in the summer of 1944, although how close the margin was between survival and disaster even Londoners themselves never quite knew. And then, the day after the battle had been officially declared ended, came Hitler's newest vengeance weapon, the V-2.

A "Capital of Democracy"

Looking out my hotel window at the great gray city, at the vast panorama of spires and chimney pots, I reflected often on the miracle that had saved it for the world. The Germans in their hatred were determined to wipe out this capital of democracy.

Yet London is still the London we knew before. Battered, shabby, with many a gaping hole, there the city stands. Paris was saved by surrender and humiliation. Rome was preserved by the protecting wing of the Vatican. London was saved by her people—their fortitude, their stamina, their patient loyalty.

They tell a story—there are as many bombing stories as there are Londoners—about digging Mrs. Smith out of the ruins of her row house in Stepney High Street. It was a nasty job. A V-2 had tumbled the whole row of houses down just at breakfast time. After six hours of digging they got Mrs. Smith out. She was conscious and not seriously injured.

A member of the Women's Voluntary Services began to take down her record. A husband? Yes, she had a husband. Where was her husband?

"He's at the front, the dirty coward," Mrs. Smith replied.

That story was told at the height of the V-2 attack in the winter of 1945. The first rocket bombs had fallen on London on D Day plus seven—June 13. As the summer wore on, casualties in London and in "Bomb Alley"—the path the rockets took across Kent, Sussex, and Surrey—grew to front-line proportions.

Between June 17 and the end of August, 5,479 persons were killed and 15,934 injured, most of them women and children.

What astonishes the visitor returning after that ordeal is how much like its old self the city looks. That, at any rate, is the first impression. And one reason is that few bombs, comparatively speaking, fell in the West End, or Whitehall, the section that visitors know best.

Little Damage to Grosvenor Square

Let us say that you are staying in one of the well-known West End hotels. Almost without exception these hotels survived the battle, suffering only the most minor damage. You get in a cab, one of those quaint turn-around-on-a-dime taxis that have kept running all during the war, and drive through Grosvenor Square.

The massive building that houses the offices of the American Embassy, completed not long before the outbreak of the war, seems to

* See, by Harvey Klemmer, in the NATIONAL GEOGRAPHIC MAGAZINE, "Everyday Life in Wartime England," April, 1941, and "'Blood, Toil, Tears, and Sweat,'" August, 1942.

J. Gordon Miller

War Spares the Familiar Face of Trafalgar Square; Nelson Stands Atop His Column

No V-bombs landed in this area. Visitors poured in and out of the National Gallery (dome, left). St. Martin in the Fields (right) suffered a minor hit in the blitz. In 1726 this graceful church was built at what was then the edge of the city. Now a center of Greater London, the Square was laid out in the 1830's to commemorate Lord Nelson's victory at Trafalgar.

be unscratched. In the months before D Day Grosvenor Square was called, ironically, Eisenhower Platz, and Londoners said that you needed an American passport to enter.*

Down Audley Street and into Berkeley Square and still you have to look for damage. A V-1 fell at one corner of Berkeley Square and sheared away the side of a handsome town house, so that you look into ruined drawing room and bedrooms as though at a stage set.

Bond Street is shabby but fairly intact. The clifflike facade of the Ritz is unscarred. In St. James's Street the handsome bow window of White's, the club which is never called a club, looks out on the traffic with the same early-19th-century disdain for what is new and contemporary.

Buckingham Palace suffered several hits in the blitz, and in the summer of 1944 a V-1 fell in the gardens. But the visitor who passes the great wrought-iron gates sees nothing untoward. The damage done to St. James's Palace is not visible to the passer-by.

Trafalgar Square Unharmed

Trafalgar Square looks just as it did before the war. Nelson is secure atop his column (page 137). All through the battle of London crowds passed in and out of the big doors of the National Gallery, which is on the north side of the square looking down toward Whitehall. The priceless pictures had, of course, long since been secreted in a special bombproof hiding place in the country. The public came to see special war exhibits and to listen to symphony concerts.

Farther around the square, just off the Strand, with its ceaseless flow of traffic, is the

* See "When GI Joes Took London," by Maj. Frederick Simpich, Jr., in the NATIONAL GEOGRAPHIC MAGAZINE, September, 1944.

Army

This Is the Way Hitler "Marched Against England"

As rescue workers reach him, a dazed V-2 victim clings to debris that was his home. Many Londoners, with stubborn loyalty, stayed in their bombed-out homesites, occupying shacks built from wreckage. American soldiers helped build shelters for thousands (page 150).

church known as St. Martin in the Fields, one of London's most familiar landmarks.

St. Martin's was completed in 1726, in what was still almost a village, and it did not become a conspicuous public building until Trafalgar Square was laid out and the approaches to the Strand ingeniously replanned. Happily this handsome church suffered nothing worse than a minor hit in the basement story which did not seriously damage the structure.

If you were a Rip van Winkle dropped down in Whitehall, you would have to be told that London had been through a battle that threatened its destruction. Here in this short street is the heart of empire. The grimy building that houses New Scotland Yard, the Treasury, the Foreign Office, the Admiralty, all are here.

While they seem to have come through unscathed, that is not entirely true. There were bomb hits here during the Nazi blitz in the early years of the war. As we talked over tea in the handsome paneled room that is his private office in the Foreign Office, Foreign Secretary Anthony Eden told me about his visit from the late Wendell L. Willkie in January of 1941.

Most of the windows of the Foreign Office had been blown out by a bomb blast a few days before. As Willkie departed, Eden accompanied him down the corridor. The American expressed a desire to talk with ordinary Britons in order to find out what they thought about the war. Eden replied by saying he hoped Willkie would do just that, talk with plain people wherever he found them.

At this point they passed a workman on a high scaffolding, replacing windowpanes which had been blasted out. Willkie paused and looked up at him. When he had caught the man's attention, he asked:

"How do you feel about going on with this war?"

British Combine

A Bomb Splintered the Ancient Cloister Court of Parliament

The House of Commons, in an adjoining section of the rambling, massive home of British Government, was wrecked in May, 1941. Members carried on in the House of Lords' chamber. Cloister Court, relic of the old Palace of Westminster, survived the fire of 1834 which burned most of the original structure on this site.

There was a moment of hesitation.

"Well, 'Itler ain't dead yet, is 'e?" came the reply in a broad cockney accent.

A hundred yards down Downing Street, opposite the entrance to the Foreign Office, stands No. 10. At least twice the windows of the Prime Minister's official residence were bombed out.

In 1941 a bomb fell on the Treasury near by. Prime Minister Churchill was at dinner with friends when the house shook and pieces of plaster fell from the dining-room ceiling. No one was injured. But with that warning the men around Churchill succeeded in persuading him not to sleep in the official residence.

Two Famous Monuments

In Parliament Square, at the end of Whitehall, are London's two most famous monuments, Westminster Abbey, which every American from the three-day tourist to the highest dignitary invariably visits, and the Palace of Westminster, better known as the Houses of Parliament.

The Abbey, seriously damaged at the crossing of the nave and the transept, is still thronged with visitors. Bombs burned out the Deanery, which was next to the great cloisters, as well as the small cloisters and charming residences of the clergy. Westminster School was also badly damaged.

On the night of May 10, 1941, in one of the heaviest raids on London, fire bombs fell on the chamber in which the House of Commons had met for almost a century. The next morning Prime Minister Churchill and John Edwin Holman, the Clerk of Works for both Commons and Lords, surveyed the charred and smoking ruins.

The two men grieved over the destruction of the hall that had seen so much history. Four years later, in the course of a debate over the design for a new Commons' chamber, I heard Churchill propose that the archway into the chamber of the old House be left as a reminder of the ordeal of Parliament during the battle for London.

The rubble has been cleared away and the walls still enclose the space where once the voices of great debaters echoed. In the emergency immediately following the bombing Parliament met at Church House, in Dean's Yard, Westminster.

Then the members of Commons were invited by the House of Lords to sit in the Lords' chamber, while the Lords moved to the King's official robing room.

The Lords' chamber, which came through the battle intact, is somewhat larger than the Commons' chamber. But the visitors' galleries are so narrow that, as the Honorable Harold Nicolson put it during debate, spectators look like swallows perched on a telegraph wire.

Westminster Hall, adjoining Commons, is almost the only remaining link with the old Palace of Westminster, since both Commons and Lords were built after the fire of 1834 that destroyed medieval structures on the site. The roof of Westminster Hall, made of timbers hewn 550 years ago, was damaged during the raid. Put on in the reign of Richard II, son of Edward the Black Prince, the roof can be repaired, according to experts who have examined it.

Britons who treasure tradition take satisfaction in the fact that timbers to repair Westminster roof will come from the same forest that furnished the original beams. The forest is on the estate of a present member of Parliament, Col. Sir George Courthope, whose ancestor sold the original logs to Parliament.

Big Ben's Face Lifted

Parliament's famous clock, Big Ben, was also damaged in this raid (page 135). But it went on ticking in spite of the hit.

So quickly were repairs made and the damage tidied up that in most instances you would not know that death and destruction had passed by.

You constantly marvel at the sameness of the city until you look more closely. Then you begin to see the cumulative damage resulting from the three sustained attacks, each one taking its toll of life and property.

When the first V-2 fell in London, censorship prevented any reference to this new type of weapon. That was on September 8, 1944. Londoners joked about the secrecy. Those blasts you heard were gas-main explosions, they said. After some weeks the new rocket weapon was officially announced.

But still censorship carefully cloaked the location of the hits and the nature of the damage. Official communiqués were limited to the announcement of "bomb damage" in "southern England."

There was good reason for such censorship. Most Britishers knew that "southern England" meant London, and the Germans may have suspected it. To have furnished them with additional information, however, would have been to aid them in correcting their aim.

That was what British authorities feared above everything else—that the Nazis would be able to aim the newest rocket weapon at specific targets.

British official

This Stunned Londoner Lost Home and Wife in One Blow

Civil Defense workers salvage a blanketful of his belongings from the wreckage where a V-1 hit. In the 80 days of the "second battle of London," flying bombs killed 5,479 persons and injured 15,934, mostly women and children.

One of the few V-2's to fall in the West End hit in Oxford Street near Selfridge's department store, which is another familiar landmark for American visitors. Like almost every V-2 hit, it produced freakish as well as tragic effects. A friend of mine happened to be passing scarcely more than five hundred feet from the spot where this bomb hit.

It did not even knock off his hat. He said he was conscious only of a sheet of flame. Then for a minute or two following the explosion there was a rain of minute particles of glass. Yet windows in buildings a mile and a half distant were blown out.

When the ton of explosive in the warhead of a V-2 let go, it produced eccentric concussion paths. A passer-by 500 feet away might be unharmed, while another two blocks away was killed. A great deal depended on how the glass shattered, since a high proportion of casualties came from splintered glass.

Often panes of glass were broken into murderous shards that were sent flying through the air with shotgun force. A woman and her four children were asleep in two rooms in London's East End near where a V-2 bomb fell. Six-inch splinters of glass were driven into the walls and two heavy doors were blown across from one room to another. Yet mother and children escaped serious injury.

London's "Battlefield"

It was in South and East London, in crowded working-class quarters and in populous suburbs, that most of the V-1's and the V-2's seemed to fall. When you crossed Lambeth Bridge, you realized at once that you were on a battlefield. Here it seemed that almost every other row of houses was either smashed or the windows were knocked out.

I visited Bermondsey one morning in a car with members of the Women's Voluntary Services. The WVS did a phenomenal job all through the battle of London, beginning with the terrible fire blitz and going right on through to the last of the V-2's, which fell at the end of March.

My guide was Miss Noel Streatfeild, British author who devoted most of her time for five years to the work of the WVS.

We had been alerted in readiness for a bomb hit. That meant we were prepared at a WVS station to go immediately to the scene of what the British called, with their

genius for understatement, an "incident." We arrived at the "incident" less than an hour after the rocket had hit. The V-2 had fallen in a cemetery just across the street from a row of what had been pleasant cottages.

I shall never forget that sight of chaos and ruin where so short a time before there had been the peaceful, orderly routine of a neighborhood breakfasting and starting off to shop and school. Nor shall I soon forget the quiet, earnest way the women of the WVS went to work to help broken families find their way back to something like a normal life again.

There were, of course, official fire, salvage, and repair services which had preceded us. In fact, when we arrived on the scene, workers were already putting glazed linen in the shattered window frames of the houses that were still habitable.

The dead and those seriously injured were being removed. Digging squads were working to make sure that no one was left in the block that had suffered the heaviest damage.

One of the first tasks of the WVS was to set up an "inquiry point" in a near-by store. Here relatives and friends came to find out what had happened to those nearest and dearest to them. Another task of the WVS was to find clothing for those who had lost everything except the torn clothes they were in when they were pulled out of the wreckage; and most important of all, perhaps, was to find some place for bombed-out families to live in overcrowded London.

You were suddenly aware of the threads of human life that trailed off in all directions. "My husband is coming home on leave in a day or two, and what if he comes and finds this. . . ." "The boy is in school and he must be told." "My daughter's fiancé. . . he'll have to know."

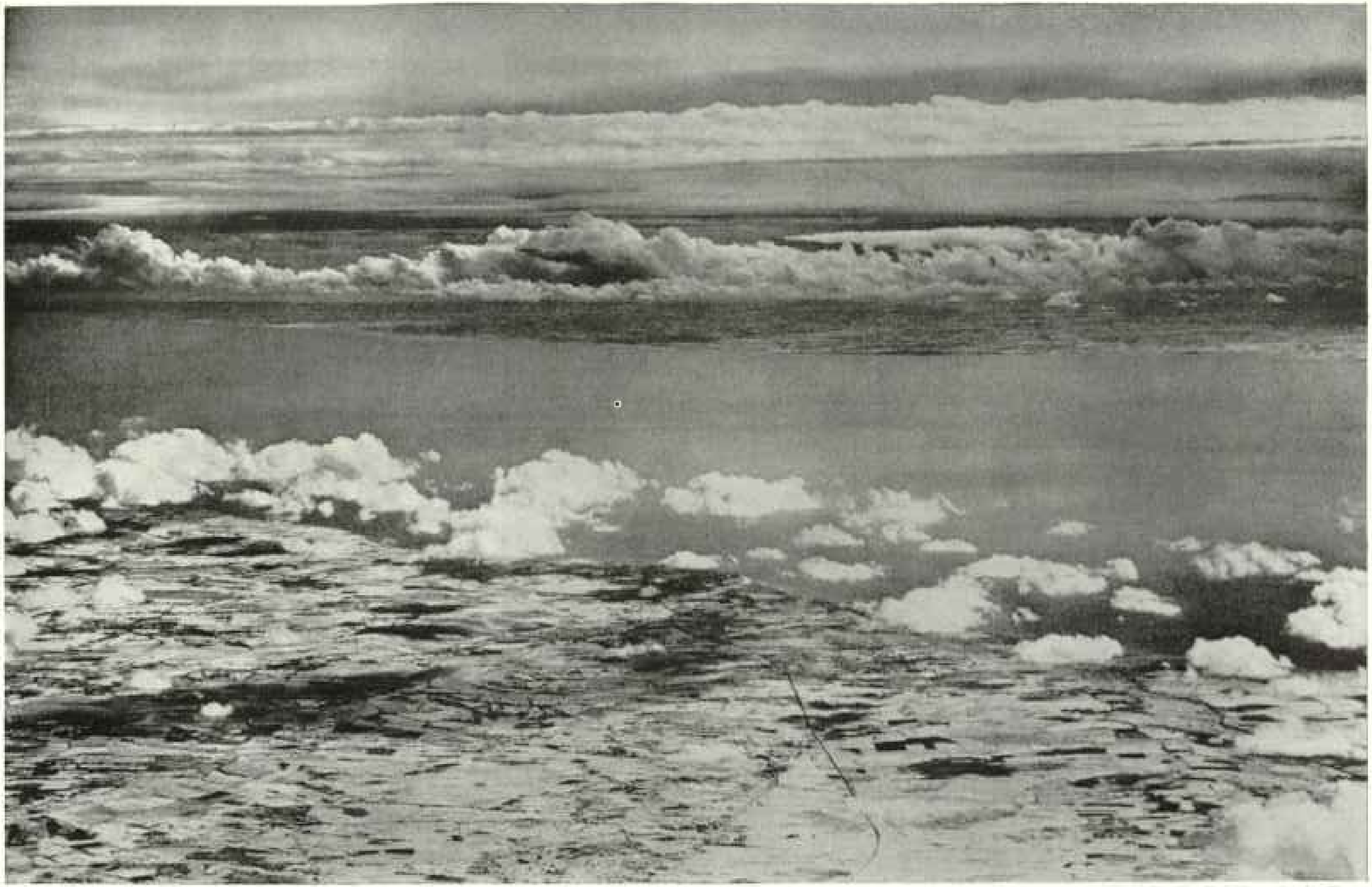
A child's pet dog could not be found. Patiently, and with quiet understanding, the women of the WVS worked to put to rights again the lives of these victims of the battle for London.

Householders often clung with stubborn loyalty to what remained of their homes (page 131). On one long row of houses were official signs stating that they had been condemned because of the extent of damage from a

British Combine

Bomb-struck, Big Ben Kept on Ticking

A workman repairing the damage wedged his hammer in the works; the world's largest striking clock stopped only momentarily. Installation of a new pendulum suspension spring caused Big Ben to gain a few seconds a day, spoiling an 86-year record for keeping correct time. Big Ben's chimes have introduced Prime Minister Churchill's radio addresses.



The New York Times-London Times

From 20,000 Feet the English Channel Looks Like a River Between England's Kent and France's Calais Area

A straight section of the main Southern Railway line (foreground) points directly to Folkestone on the coast. Dover lies farther to the left. Across the 20-mile-wide strait the Germans launched most of the robot bombs. The County of Kent, part of "Bomb Alley," suffered damage second only to London.

Seen across the Rooftops of Whitehall and Trafalgar Square, a "Doodlebug" Swoops down on London

This aimless missile could have hit Nelson Monument (statue at left); Coliseum (bulbous dome); St. Martin in the Fields (spire); Wesleyan Central Hall (foreground); or a Government office tower (right).

U. S. Army Signal Corps. Official

Into the Jaws of Death! American Conquerors Enter the Camouflaged Gate of a Rocket Supply Depot in France

During the V-1 assault, launching sites were hard for Allied bombers to find and hit. Robot supply and transport made easier targets.

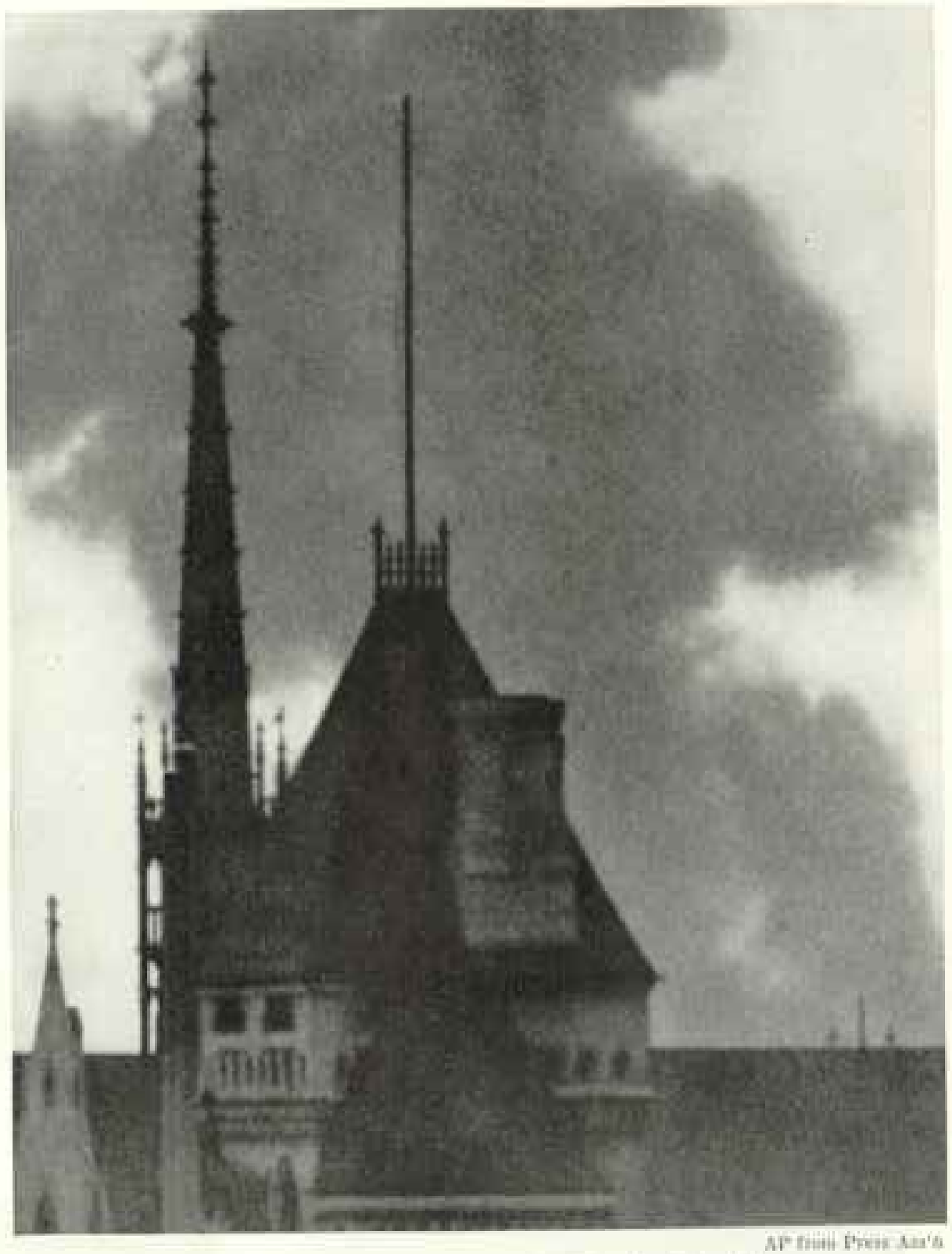
British Official

History's Biggest Balloon Barrage Tied Up German Traffic in "Bomb Alley," the Robot Route to London

Cable-anchored, unmanned balloons entangled 279 low-flying buzz bombs. Of some 8,070 V-1's launched, only 2,300 reached the London area. Fighters and anti-aircraft guns got some; others fell in the Channel or exploded in France. London's last line of defense, 2,000 balloons, brought down nearly 15 percent of all robots entering their zone. More than 100 "sausages" show in this picture.

A Robot Plummets Londonward Behind the Law Courts Towers

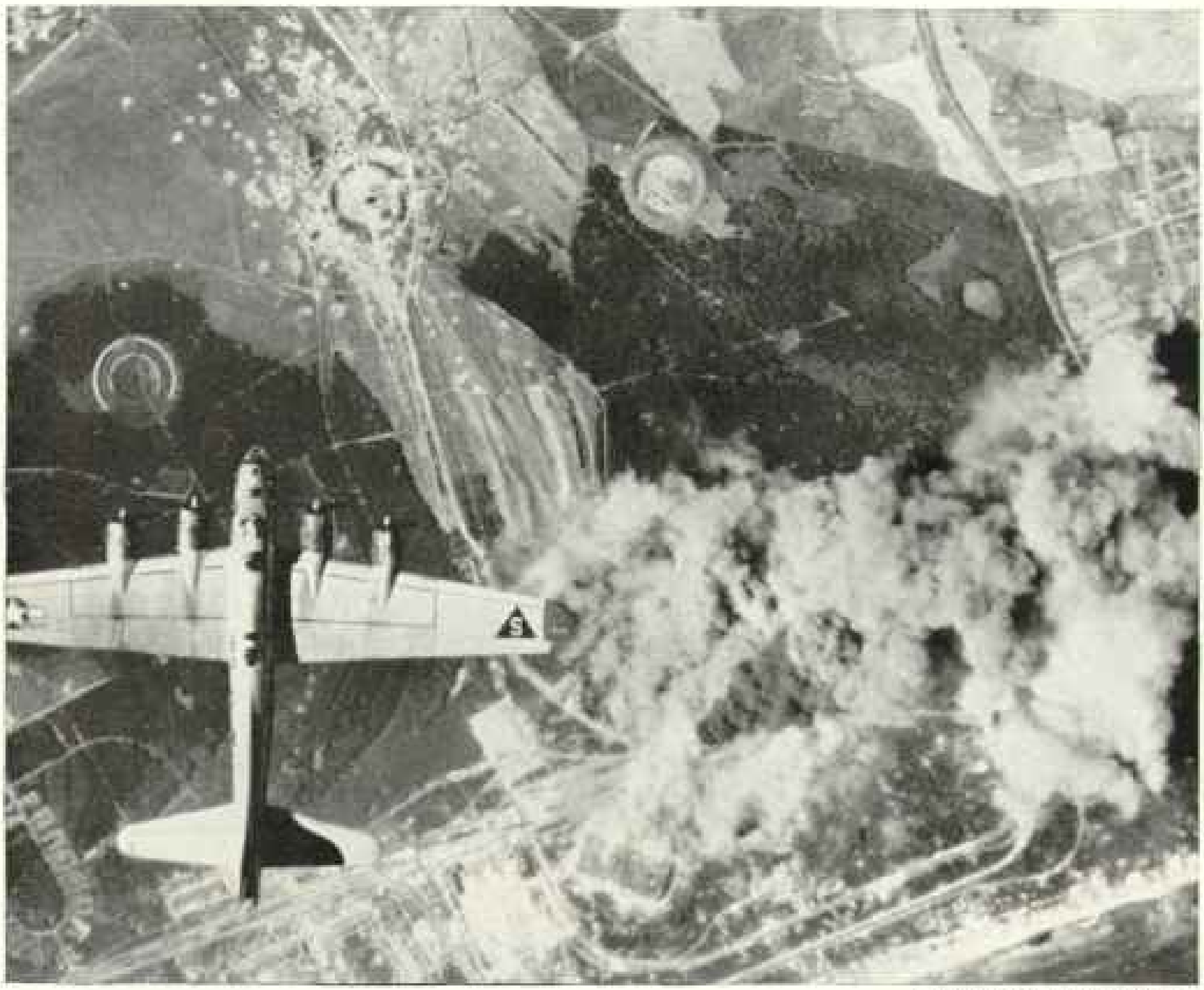
A noisy, throbbing motor gave the buzz bomb its name. Automatically it shut off as the pilotless plane went into a steep dive. Ten terrifying seconds of eerie silence warned victims of the approaching explosion.



AP from Press Ass'n

Smoke Fills the Sky as the Bomb Explodes

The *Daily Herald* building and other structures were blasted by this direct hit in central London. The robot's warhead carried a one-ton charge. To get these pictures, the photographer stood on a Fleet Street rooftop.



U. S. Army Signal Corps, Official

A Flying Fortress Bombs Peenemünde, Where Robot Bombs Were Born

In April, 1943, British agents reported Germans working on a new bombardment weapon. Reconnaissance revealed this Baltic island as the experimental site. Here, ten months before the first buzz bomb landed in England, the RAF began the battle against the V's with an obliteration raid that killed several scientists. Follow-up raids kept the Nazis from launching their weapon until after D Day. The target of this USAAF attack was the plant making a V-bomb fuel.

near-by bomb hit and the fire that followed. We went through a passage and into the narrow strip of garden back of the row. There a family was living in what had been a tool shed. They slept at night in a sheet-metal Anderson bomb shelter close by.

"My husband is clever," the wife said. "He fixed up this shed just as cozy for us. And we saved a lot of things from our house to furnish it with."

V-1's vs. V-2's

Opinion in London varies widely as to which was the worst—the blitz by bombs from the air, the V-1's, or the V-2's.

Most Londoners seemed to agree that last summer, when V-1's were dropping at an average rate of a hundred a day, was perhaps the worst. They came after nearly five years of war when nerves were frayed.

Then, too, they made a frightful noise. Some came over even below 1,000 feet, with a roar that was like the sound of twenty motorcycles pounding through your living room. When the roaring noise stopped, you jumped for whatever cover you could find, for the silence meant that the "doodlebug"—another beautiful example of British understatement—was falling and about to hit.

Because their approach over the Channel could be detected by radar, the sirens would sound as a V-1 approached. During the bad days they sounded most of the time.

Along with the sirens went the crashing and banging of the ack-ack barrage and the rattle of falling shrapnel. Yes, the V-1's were bad, any Londoner will tell you.

You never knew when you said goodbye to your family in the morning whether you would ever see them again. The English wife

Acme

Regent's Park Was "Landscaped" with Coal to Assure Warmth for Wartime London

Lest winter weather tie up fuel transport, coal was dumped in various London parks. Bomb rubble temporarily covered the Regent's Park greensward, where sportsmen hunted deer in Sir Walter Raleigh's time. Formerly called Marylebone Fields, the grounds were redesigned in 1812 for the Prince Regent, who was later King George IV.

of an American correspondent arrived a few days after the V-1 attack began. The second day she was in London she was knocked down twice by bomb explosions and missed death only because she was characteristically late to a luncheon appointment. When she returned to their flat after receiving first-aid treatment, her frantic husband promptly sent her to the country and safety.

Only a few high officials in the Government were aware that the battle of the V's had actually begun more than a year before. These same men knew, too, how close the city came to losing the battle. It is one of the fascinating and little-known stories of the war.

It began with the report by British Secret Service agents in April, 1943, that the Germans were devising a new long-range bombardment weapon. Not long after this first report aerial reconnaissance showed a large experimental station at Peenemünde on an island in the Baltic. But what the Germans were up to at Peenemünde no one at first could explain.

The experimental station was repeatedly photographed from the air. Finally Flight Officer Constance Babington-Smith, of the Women's Auxiliary Air Force, an expert in photo interpretation, discovered a blurred speck on one of the photographs which proved when enlarged many times to be a small airplane sitting on a sloping ramp fitted with rails.

Photograph Spots Vengeance Weapon

A later photograph showed that the plane was gone, but the ground near the ramp was streaked as though it had been seared by a fierce blast. From this and other evidence it was concluded that the speck was a pilotless, jet-propelled aircraft.

It might have been, of course, merely a

Brit. Info. Services

On V-E Day Prime Minister Churchill Is Mobbed in Parliament Street by the Heroes and Heroines of the Battle of London

Having just broadcast to the British Empire Germany's unconditional surrender, he is passing with difficulty through cheering crowds to a tremendous ovation in the House of Commons. In the distance is the Cenotaph, commemorating the 1,089,919 British dead in World War I.

target plane such as all air forces use in aerial gunnery practice. The pilotless plane was, however, the V-1—Hitler's *Vergeltungswaffe*, or Vengeance Weapon.

On August 17 a strong force of RAF bombers dropped more than 1,500 tons of high explosives on Peenemünde (page 140). Intelligence from Secret Service agents indicated that several top scientists and many experimenters were killed in that raid. It was the initial victory in the battle of the V's.

Combating the "Vengeance Weapon"

In October and November aerial reconnaissance once again disclosed the Germans' intentions. Photographs showed that the Nazis were constructing a chain of concrete launching platforms like those at Peenemünde all along the French coast from Calais to Cherbourg. They were pointed in the direction of London. The RAF and the 8th Air Force of the USAAF began intensive bombing of the launching sites in December.

As fast as the Germans put up a new site, Allied bombers knocked it down. The bombing offensive continued through the winter and the spring. Besides launching sites, supply dumps, bomb plants, and experimental stations were hit. It was costly. The RAF and the AAF lost nearly 450 planes and about 2,900 crew members.

In March of last year the Germans were forced to give up the struggle. They abandoned their original sites and began to build much simpler launching ramps which took only six weeks instead of two or three months to construct. Moreover, this simpler type could be so thoroughly camouflaged that it was practically impossible to detect them until they had actually fired.

But the Allied bombing offensive had done its work. It is not an exaggeration to say that it saved London. The German plan was to begin launching V-1's in January. If they had gone through with the original plan, they would have worked up to a rate of 1,000 V-1's a day hurled at the London area. In this same area were great concentrations of men and supplies for the Normandy invasion.

If the rockets had started in January, it would have been far more difficult to shoot them down, because of the winter fogs. Destruction of the original launching sites gave the War Cabinet Committee on Operational Measures Against the Flying Bombs time to organize the defense of London.

A balloon barrage was put up immediately surrounding the city (page 138). Antiaircraft guns were established in a ring outside the balloon barrage. Outside that was a zone of fighter planes with pilots constantly on the alert. This was going on, remember, at the same time that preparations for D Day were converting all England into one vast arsenal.

The first pilots to go after the V's found they were an enormously difficult target. They traveled at 350 to 400 miles an hour and their course was often erratic. Likewise, the ack-ack guns found it almost impossible to shoot them down because they flew at a level that was too low for the heavy guns and too high for the light guns.

This handicap was removed when the guns were shifted to the coast, where they were able to use their full range.

That in itself was a tremendous undertaking, moving 1,100 antiaircraft guns from London to the south coast. Two days after they were taken up, they were resited and in action again.

American Men and Machines Participated in the "Battle of London"

Many Americans took part in this phase of the battle of London, just as they had in the bombing offensive against the launching sites. One-eighth of all ack-ack guns along the south coast were American batteries.

At one point special American radar equipment was so essential that, at the personal request of Prime Minister Churchill to the late President Roosevelt, British planes were sent to American factories and within a few hours flew back with the precious gadgets.

According to official reports, the coastal guns brought their percentage of hits up from 17 percent the first week to 24 percent the second, 27 the third, and 74 the sixth week.

Fighter pilots, too, developed remarkable accuracy, considering the difficulties of the small, fast target. RAF pilots brought down more than 1,900 flying bombs during the eighty days they were being launched from across the Channel.

In September of 1944 Allied troops occupied the Calais area of France (page 136). They captured sites from which rocket bombs had been launched against London. But they found more than that.

In Marquise, a village near Calais and 95 miles from London, the Germans had constructed a raid-proof battery from which they had intended to launch a new type of rocket or shell. The battery was composed of 50 long-range guns with barrels 400 feet long.

These extraordinary guns were designed to fire a shell six inches in caliber which would fall continuously on the British capital and force rescue workers, firemen, and police into shelters while V-1's and V-2's fell at regular

intervals to cause the chief devastation. Bristol, Portsmouth, and Birmingham were also marked for destruction.

Most of the site at Marquise was in five large sloping shafts, each more than 400 feet long. The area around the entrances and the exits was covered with steel and concrete 18 feet thick. There were vast storerooms hewn out of chalk, as well as barrack rooms, officers' quarters, and research departments.

What was most remarkable about the guns was that they had no rifling and therefore were not limited to a fixed number of rounds. British experts believe the Germans had discovered a new method of long-range fire and perhaps a new propulsion for shells.

As British intelligence put the story together, the Germans had planned to have the battery in operation in the fall of 1944. They worked frantically at the project until July, when the Allied invasion compelled them to abandon it before it was completed.

At Wizernes, near Calais, under a dome made of 40 feet of concrete and steel, the Germans had nearly finished work on a raid-proof rocket launching site. The dome contained holes with massive steel covers that could be opened as the rockets were fired from 100 feet below ground. This site had four underground floors, and large bombproof doors protected a maze of storerooms, galleries, and loading stations. British ordnance experts believe that a new and more sinister type of rocket bomb was to have been launched here.

Underground Plants for Flying Bombs

Along the French coast south of Cherbourg there were huge underground plants for assembling and storing flying bombs. In process of construction were bombproof hangars from which rockets were to be launched against Bristol and the Channel ports. Similar raid-proof sites were discovered at Siracourt and Lottinghem, as well as in the Calais area. Ten thousand slave laborers worked night and day on these projects while 5,000 German military men directed the project and did the technical and secret work.

This vast underground battery, with its terrible threat to London, was nearly 80 percent completed, according to the careful estimates of those who studied it. A visitor to the amazingly ingenious monument to destruction at Marquise was the Prime Minister. Chewing his cigar as he tramped about the site, he said with Churchillian grimness:

"We are just in time."

That was not rhetoric but the simple truth. Even under the limited offensive of last summer London suffered grievously. Many historic monuments and architectural masterpieces, cherished by generations, went down in dust. One that perished was Dr. Samuel Johnson's house in Gough Square. Those who knew the good doctor's works could turn to a passage in *Rasselas* that seemed to have foreshadowed this calamity.

"But what would be the security of the good," wrote Dr. Johnson in the 18th century, "if the bad could at pleasure invade them from the sky? Against an army sailing through clouds, neither walls, nor mountains, nor seas could afford any security. A flight of northern savages might hover in the wind, and light at once with irresistible violence upon the capital of a fruitful region that was rolling under them. Even this valley, the retreat of princes, the abode of happiness, might be violated by the sudden descent of some of the naked nations that swarm on the coast of the southern sea."

The V-1's respected neither place nor person. The London Chest Hospital in Victoria Park, which was also bombed during the blitz, suffered a hit that caused heavy casualties. The Church of St. Michael on Royal Cannon Street was damaged.

Of 22,000 houses in the Surrey towns of Sutton and Cheam, 18,000 were damaged or destroyed.* Croydon was the most heavily damaged London suburb, with three out of every four houses hit.

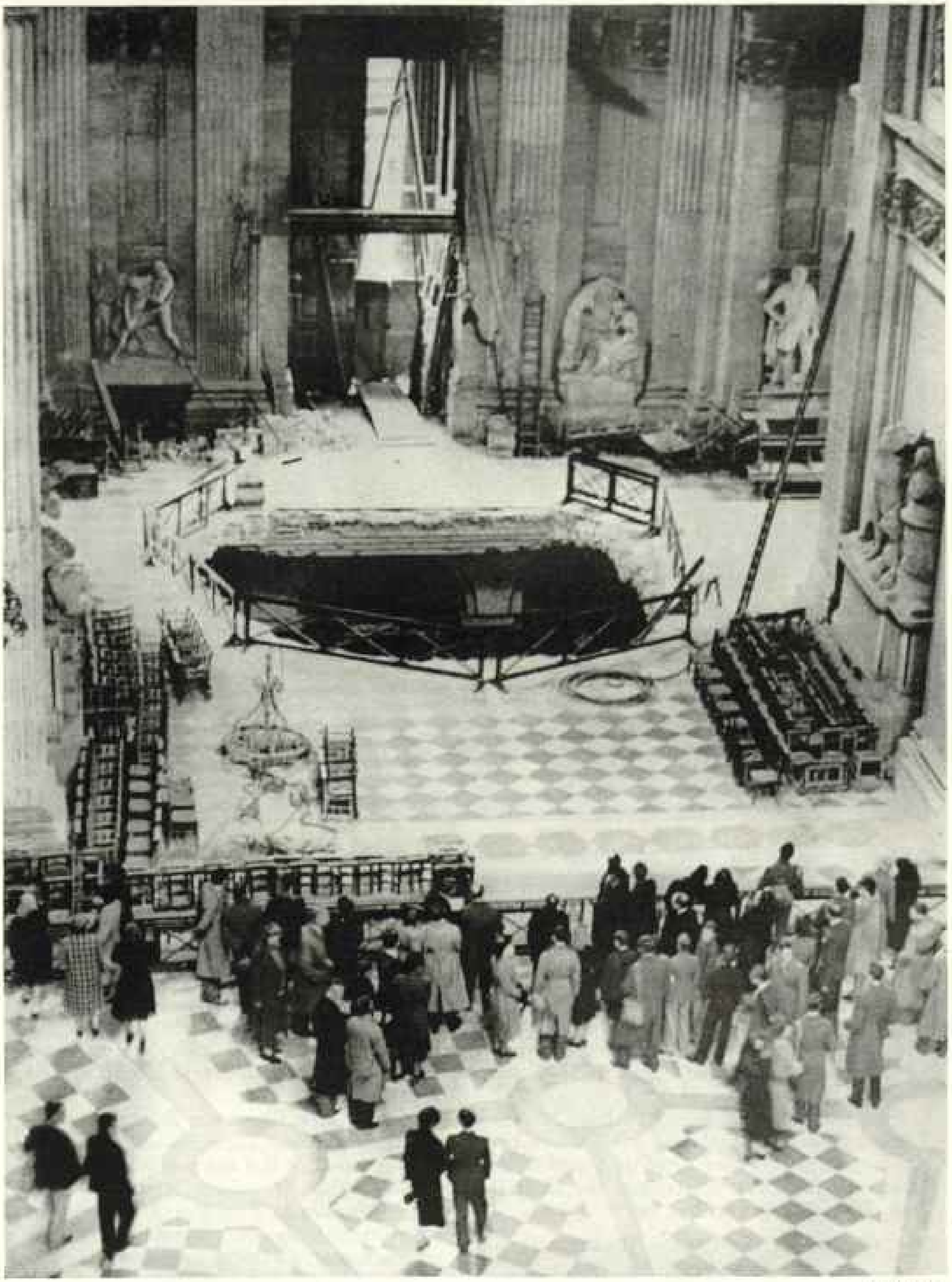
Blast produced some strange effects. In the gardens of wrecked houses in one suburb a reporter saw trees which had been almost uprooted. An apple tree filled with young fruit had been torn partly out of the earth and its leaves stripped off. A week later the tree was filled with spring blossoms. The same thing happened to a lilac bush. Botanists were at a loss to explain this curious phenomenon.

Bombings Cultivate Wild Flowers

To soften the worst scars of the battle for London, Nature intervened with one of those small miracles that human beings find strangely touching in the harsh environment in which they must live. A profusion of wild flowers sprang up in the ragged cavities left by the blitz and the havoc created by the robot bombs.

Among Londoners a legend soon took hold. These were not ordinary wild flowers. They were species that had been long extinct. But how could that be? The popular explanation went something like this:

* See Map Supplement of the British Isles, issued with THE GEOGRAPHIC of June, 1937.



Wide World

Visitors View the Gaping Hole Left by a Bomb in the North Transept of St. Paul's

In April, 1941, after a previous hit had demolished the choir, London's massive cathedral sustained this damage—now repaired. Tons of falling masonry collapsed the floor, baring the crypt. Worse damage was done to the windows. Today St. Paul's stands in solitary splendor; the blitz leveled adjacent buildings.

British Official

Softening the Scars of Battle, Volunteer Shrubs Flower in Forumlike Ruins

Here at Bond and Bruton Streets is rose-bay willow herb. Known also as fireweed, it thrives in burned areas. Spreading swiftly, it has become a nuisance in many downtown gardens. Other wild plants in London's wartime ruins include Canadian fleabane, popularly supposed to keep away fleas, and a Peruvian import called "gallant soldiers."

Old-time seeds had been preserved in cellars long since built over by the newer London. They had been released by the bombs and had quickly spread in soil fertilized by wood ashes from the fires that raged in 1940 and 1941.

Amateur botanists began to look for the London rocket (*Sisymbrium irio*), which began to grow in profusion after the fire of 1666. It has a pale-yellow flower, and the plant is from 18 inches to two feet tall.

Myth of the London Rocket

But Dr. E. J. Salisbury, director of the Royal Botanic Gardens at Kew, shattered this pleasant legend. The London rocket had not reappeared and most of the species were common wild flowers.

The greatest diversity was found, he reported, in the West End and diminished as one moved east. This was due partly to prevailing winds but also partly to the larger number of gardens in the fashionable West End residential section.

The commonest flower was the rose-bay willow herb (*Epilobium angustifolium*). Known also as fireweed, it is a handsome plant, bearing pink-purple or mauve flowers in long branching spikes to a height of four or five feet. A hardy herbaceous perennial, it became a nuisance near allotment gardens.

There are several reasons why the willow herb has a liking for burned areas. The seeds germinate freely only where they have plenty of light. Ground subjected to great heat is poisonous to many plants for some weeks, but

British Official

Workmen Lay a Tile Roof on a Damaged House in West Ham, London

Temporary felt coverings were sometimes used to cover roofless houses. During the war one out of nearly every three English homes was destroyed or damaged. When the V-attack started, London had nearly completed repairs on the one and one-half million houses damaged in the 1940–41 blitz.

not to this one; hence it was able to get ahead of its rivals.

The willow herb thrives on the nitrates found in wood ashes. It is a prolific plant, too, even a young specimen yielding as many as 80,000 seeds in a season.

Another plant identified on the bombed sites by Dr. Salisbury was a species of groundsel, Oxford ragwort, native to the scoria of Sicily and abundant on the slopes of volcanoes.

Flowers Make Wartime News

Still another plant flourishing in the ruins was one which "escaped" from Kew Gardens. It is a native of Peru, known popularly as "gallant soldiers" or "soldiers of the queen." The Canadian fleabane, reputedly helpful in keeping away fleas, also made a place for itself.

Even though London newspapers during the war have been held to about eight pages, these botanical phenomena were duly reported. There were letters to the *Times* from flower lovers and appropriate editorials. It took more than a blitz, more than the vengeance weapons, to deflect the interests and the curiosities of the British public. They were grateful for this small measure of beauty in the midst of so much destruction.

An incidental effect of the Nazi bombs that also captivated Londoners was the way in which various layers of the city's history were exposed to view.

The terrific force of the new weapons from the air sheared right down to the foundations that the Romans laid almost 2,000 years ago. When they could take time from fire fighting and rescue work, archeologists had a field day.

British Combine

Beneath the Temple's Venerable Walls, Victory Gardeners Work Their Allotments

On the dividing line between the City, the old walled portion of London, and the West End, the Temple comprises two of the four English Inns of Court. Here students, barristers, and benchers study and live. Secluded courtyards were divided into allotment gardens to help England eat. Iris grows in rubble at left.

Rover Scouts and Police Lend Helping Hands to Homeless Air-raid Victims

From the scene of the bombing, undaunted refugees have been brought by bus to a North London clearing station, where new homes are provided. England's chins-up spirit during the worst days of the blitz is reflected here. Such senior-age Scouts as these acted as messengers between Civil Defense stations in air raids.

Large sections of the old London Wall have come to light.

A piece of the ancient wall was discovered near the Tower of London. Until early in the blitz of 1940 a house had been standing directly on it. Experts who examined it concluded that the section was built in the Middle Ages on a Roman substructure with a Roman core.

Still another fragment of wall, north of Tower Hill, is believed to have been built in the first century. This would make it a part of the wall built just after the time of Boadicea (Boudicca), the British queen who rebelled against the Emperor Nero after the death of her husband A.D. 61.

Close to London Wall and over a branch of the Walbrook, the stream separating the two hills on which the earliest London was built, first-century pottery and other objects covering the whole period of the Roman occupation were found. The discovery was made in the course of sinking shafts to reinforce the basement of Western Union House, in Great Winchester Street, E. C., against air-raid damage.

At a level 24 feet below the street and 14 feet below the basement, piles of blackened oak were found rotting in blue clay, and in the clay were grasses and plants "from the roots of London."

Parts of basins and dishes made of red Samian ware were found. Two of them were stamped with the marks of potters who worked at La Graufesenque in Gaul between A.D. 70 and 90.

The earliest fragments are believed to have been pieces of mica-coated ware similar to those made in a Roman potter's kiln nearer the mouth of the Walbrook. They were brought to light along with pieces of several large amphorae, one of which still bears the mark of the potter's thumb.

Artifacts of Blitz "Sigs"

The *Times* reported that a roof tile was found which bore the footprints of a dog and cat. The dog was chasing the cat while the tile was laid out to dry in second-century London. The finial of a votive lamp and the rim of an incense burner indicated the presence of a shrine. A woman's long hairpin in

British-Combine

White as Icy Igloos Are Asbestos Roofs of Huts Built by Yanks for London's Homeless

These temporary homes fill a bomb-leveled space in Lambeth, south of the Thames. They have two bedrooms, a living-dining-kitchenette room, and bath. Englishmen marveled at the construction speed of U. S. Army carpenters, electricians, and plumbers assigned by General Eisenhower to help relieve London's housing shortage (opposite page).

gold-bronze alloy was found with a nail of the same material from a decorated casket.

Other domestic objects discovered were part of an iron stylus, with one end pointed for writing on wax, and part of a shoe. A Saxon dagger blade was found near a Roman roof tile. Terence Gould, of the Western Union Telegraph Company, arranged an exhibit of these finds in a showcase with a placard "This Is Your History."

City's Power of Survival

At Mr. Gould's invitation thousands of American soldiers on leave in London viewed this testimony to the city's power of survival through the centuries.

It may be no more than the acceleration of history that has occurred in our crowded time, but the battle of London has shown how quickly a scene of destruction can become a historic ruin. Perhaps the best example is the Middle Temple Hall, which dated from the 16th century.

In the spring of 1943 I was in Fleet Street on an evening of clear moonlight. I walked through old Mitre Court and found myself in the ruins of the Temple.* Softened by moonlight, the impression was of a remote, almost a desert, place in which one had suddenly come upon the noble remains of an old civilization. That impression was accentuated by the silence.

London during the blackout, particularly after 10 or 10:30, was strangely quiet. The only movement in the streets was a rare taxi. And when that rare taxi passed by there seemed to be invariably a dozen claimants shouting, "Taxi, taxi!" and winking their flashlights hopefully.

* See "Some Forgotten Corners of London," by Harold Donaldson Eberlein, in the NATIONAL GEOGRAPHIC MAGAZINE, February, 1932.

More often than not the driver would pass on, ignoring these piteous pleas, either because he had a fare or because he was about to exhaust his precious supply of petrol.

Ghosts of the Temple Ruins

As I stood in the ruins of the Temple, I could hear in the silence of the night the rumble of the subway which was not far off. So many figures out of the distant past were incongruously present. From there the Knights of the Temple had gone off to the Crusades.

It was in Middle Temple Hall that *Twelfth Night*, with Shakespeare himself probably in the cast, was first produced.

Charles Lamb was born in a room in one corner of Crown Office Row.

The ghosts of all the bewigged lawyers who had come in later years to take over the Temple sadly surveyed the little that was left of their historic chambers. The law library was destroyed and the tower at the corner was sent toppling into the courtyard.

Long since, of course, the rubble had been cleared away; the splinters of the richly carved wooden screen supporting the Minstrels' Gallery in the Hall were carted off with the plaster and the dust. Some furniture could be salvaged.

The 29-foot table, of Windsor oak, presented by Queen Elizabeth, was badly scarred, but it can be restored. Some say that on this table Elizabeth signed the death warrant of Mary, Queen of Scots.

The Ancient Monuments Division of the Ministry of Works labored tirelessly throughout the war to save what could be salvaged. Sometimes architectural experts and antiquarians would arrive at a site just in time to prevent demolition squads from adding the final touch of destruction.

St. Paul's a Shrine of Survival

Where historic buildings were entirely wiped out, they were careful to put up markers stating what had been there. Thus in the great empty spaces where fire bombs burned out much of London's City, you come on a sign that says: "The house formerly on this site was frequented by Sir Christopher Wren. Thence he watched the building of St. Paul's Cathedral."

That is a gleam of cheer on which Londoners, with characteristic determination, have seized. Before the blitz you could never get a really good view of St. Paul's, they tell you. Today it stands in solitary splendor, a miraculous survivor of one of the worst night raids of the entire war (page 145).

Britons of every rank visit it as a shrine, as a token of the survival of the city itself. Through one morning I watched them pass in and out, looking solemn but somehow proud, too: mothers with their sons home on furlough; small boys from a London school wearing navy-blue caps; teen-age girls with their fathers, on a rare trip to town.

And mingling with them, as they mingled everywhere in the months before D Day, sightseeing GI's.

Proud Londoners will tell you, too, that thanks to the blackout they were able to appreciate once again the beauty of their city by night. With no garish electric signs, with no street lamps, with traffic lights reduced to mere slits of red and green, the shapes of ancient London were sharp in the moonlight or under the stars.

It will never be the same when all the lights are restored again, they say, and they say it with something like regret.

I can understand why they feel as they do. I walked along the Thames Embankment on a winter night when the full moon flooded the river with a soft light, a kind of gray-blue luminosity.

Across the Thames were the hulking shadows on half-ruined warehouses, and a barge moved slowly up the stream. The scene was full of a magic that would be dispelled when the lights were turned up. This was the London of Whistler and before, the London of misty distances and subtle vistas.

Most Londoners will gladly trade it for a little normal light, for the gaudy welcome of a theater marquee flashing once again the name of a movie star or a hit play. It may be rather a long time before those lights of the popular song are all turned on again. One reason is that the lighting system of Greater London is divided among more than fifty different lighting units.

Some streets still have gas lamps. No new equipment has been manufactured during the war. Bulbs of sufficient wattage are scarce. In short, it is not just a matter of turning a switch. It will take time to overcome nearly six years of darkness.

That is even truer when it comes to dwellings. The city is fearfully overcrowded. Toward the end of the war in Europe, 40,000 people were registered for flats in the West End alone and exactly six were listed as vacant.

GI's Help Combat Housing Shortage

To give some relief, the Ministry of Works has put up temporary shelters in badly bombed areas. Assembled in sections sent from the factory ready-made, they come in

Arnse

An Air-raid Warden Comforts a V-1 Victim

Rescued from her shattered home, the child reflects the terror of robot bombing. England moved 537,000 children to safe areas. Mothers, old and infirm persons, and hospital patients were evacuated by the thousands.

several sizes. The commonest size consists of two bedrooms, a combined living room and kitchen, and bath (page 150).

In December of 1944, on order of General Eisenhower, some 3,000 American soldiers drawn from the Engineer Corps were put to work erecting these shelters. Some had been building-trades workers—electricians, carpenters, plumbers—back home, and they soon established records for speed in putting up the boxlike huts. Londoners gaped in astonishment as shelters sprang up like mushrooms from sites where bombs had leveled all previous structures. It made no end of good will for America.

These shelters are temporary. They will eventually give way to the handsome new London that exists today on the drawing boards of architects and planners. They talk about it a great deal, this new London. When our men come back from the war, they'll want it better than before, you are told.

Knowing something about the characteristics of John Bull's people, I have a suspicion that the new London will not look too different from the London of the past. Oh, there will be new homes and new streets and proud new vistas. But the ancient, gray character of the city will never change.

Weighted with history, with all that has gone on in the long pageant of the years, it has the changeless look of some ancient bulwark of Nature; of low hills gently eroded with the passing of centuries.

In their triumph Londoners take a quiet pride. Back of the Admiralty building is a big beehive built of thick layers of steel, concrete, and brick. That, one is told, was to have been the last citadel, the last defended place if the barbarians from the east had actually fought their way across the tight little isle. There were the papers, the symbols, the secrets. There the last defenders would have died.

It has cost so much. How much no one will know except those who have lived through this battle.

Now, in the hour of triumph, the city is like a flag, a flag that is scarred and tattered but still proudly waving.*

* For additional articles on London, in the National Geographic Magazine, see "As London Toils and Spins," by Frederick Simpich, January, 1937; "Along London's Coronation Route," by Maynard Owen Williams, May, 1937; "London from a Bus Top," by Herbert Corey, May, 1926; and "Vagabonding in England," by John McWilliams, March, 1934.

Grass Makes Wyoming Fat

By Frederick Simpich

HIGH up on wind-swept Continental Divide hangs the spectacular State of Wyoming. It's so high up that streams rising here fairly fall down in their babbling haste to join faraway Columbia, Colorado, and Mississippi systems.

Roads to near neighbors Nebraska, Montana, Idaho, and Colorado run downhill. The State averages more than 1¾ miles above sea level, and Gannett Peak, the highest, reaches to 13,785 feet.

Down some of Wyoming's mountain slopes, on avalanche days, boulders big as houses may come tumbling; landscape here is still in the making.

"Parts of our State are so rough," joked a cowboy, "that an owl would break his wings trying to fly over them.

From dinosaur to dude ranch this region has seen a long span of life and a merry one.

Wild Animals Still at Large

Most of Yellowstone National Park* lies within the State. Roaming in Wyoming you still meet many wild animals. On open-range roads antelope herds raced our car.

Once we stopped, I waved my hat slowly, and the curious animals edged cautiously toward us to investigate. Beavers annoy farmers, building dams in their irrigation ditches. And Jackson Hole ranchers have to throw rocks and build high fences to keep marauding elk from tearing down their haystacks.

Today, on lush leagues of wild grass in this, one of the grassiest of our States, herds of sheep and cattle form walking chemical works. Eating grass where dinosaurs ate it eons ago, they turn it into meat, fat, hides for shoes, and wool for clothes.

Human population averages about 2½ per square mile, as against 504 in Massachusetts. Twenty times more domestic animals than people live here.

This State is rich in oil, coal, and iron. It has bean and sugar-beet fields and makes millions from dude ranches, but grass is above all. Even the early fur trappers noticed that in spring deer and buffalo were in good shape. They simply pawed off the snow in winter and fed on last year's grass.

Later, when Oregon Trail emigrants swarmed through, they marveled at the waving sea of summer verdure, belly-deep to oxen.

Though Northern markets were their original goal, it was grass which soon led Texans to drive millions of cattle up the trails. In 1884 alone an estimated 300,000 came. I talked with veterans who made this long march. They swam flooded rivers, choked on dust, lived frugally, spent wild nights in cow towns along the way, gambled their wages, and got knocked down and run over in stampedes.

In such bovine panics some steers crowded so close they broke off each other's horns or stumbled to the ground and got pounded by so many hoofs that their bodies were worn almost clean of hair!

From Hoofs, Horns, and Tails to Prize Bulls

You could talk a lifetime about the wonders of Wyoming, especially if you're from Wyoming! Yet its luxuriant grass, for herds and flocks that fatten on it, is the theme that is repeated like a popular song through the whole musical story of the State.

Styles in cows change, as do automobile bodies.† The great-great-grandmother of today's fat, sluggish, white-faced bovine, heavy with T-bones and prime ribs, may have been just a skinny, gully-jumping Texas heifer.

In the late 1870's such longhorn brutes of the trail sold here for as little as $7 or $8 each. Now their carefully crossbred descendants, as prize bulls, sell even to faraway overseas stock farms for incredibly high prices. One Hereford heifer sold near Cheyenne in October, 1944, for $20,000 (page 155).

Wyoming's State flower is the Indian paintbrush. But the best-known State trademark is the picture of a cowboy sticking on a bucking bronco. It greets you on signboards, cafe menus, and on every auto tag.

Bovine "social register" is the State Brand Book.* It lists some 20,000 cow marks and their owners' names. "Searing a sign on an animal's hide to show ownership is as old as slave branding," says Russell Thorp, former Secretary of the Wyoming Stock Growers Association (page 186).

Oldest brand in continuous use here is the "M hook," owned by the Myers family. A stenographer designed it from the M hook in Pitman shorthand.

"Brands may look like hieroglyphics to you," said Mr. Thorp, "but they're plain as auto tags to cowmen, and they form the base

* See "Fabulous Yellowstone," by Frederick G. Vosburgh, in the National Geographic Magazine, June, 1940, and "Our National Parks," by L. F. Schmeckebier, June, 1932.

† See "Taurine World," by Alvin Howard Sanders, in the National Geographic Magazine, December, 1925.

Charles J. Belden

Wyoming, Hanging on the Continental Divide, Is So High Its Rivers Flow Out in Four Directions

Conspicuous in the State's rough-and-tumble geography are the Bighorn Mountains and the canyon of the river of the same name. The wide chasm cuts through the mountains on the Montana-Wyoming border. In places its vertical walls are 7,000 feet high, leaving little or no bank above the river.

of a rich cow-country vocabulary and history. They're made by numerals, combinations of letters, and many odd patterns, ranging from tin cans, cats, and crowns to 'lazy pants' and an ivy leaf. An Englishman adopted '76,' the year he came over.

"To keep track of more than a million cattle, you can't name each one, as you do Pullman cars, or even number them like automobiles. So, whether a rancher runs 500 head or 10,000, he puts his identifying mark on each one.

"Cow stealing was Wyoming's first big racket, widely practiced long before we coined the word. As early as 1874 we had to hire private detectives to catch thieves.

"One famous detective was Claude L. Talbot. He knew all our brands by heart. He could read them or spot a defaced brand as fast as cattle ran past him. He recovered thousands of stolen cattle, worth millions, and helped put crowds of thieves in jail.

"To this day our association keeps detectives, known now as inspectors, on duty at stockyards in Omaha, Denver, Chicago, Kansas City, Salt Lake City, and many other marketing centers, to check all Wyoming cattle unloaded there. They look at brands on every 'critter,' and guard rightful owners against loss. Of course honest mistakes are often made, as when animals from neighboring ranches may be accidentally mixed. But stealing still goes on."

Counterfeiting Cattle Brands

I asked Mr. Thorp if brands are still tampered with.

"Here's your answer," he said, showing me a square of dried cowskin with a brand on it. "This is a slick job of working over a brand. From the outside, only an expert would notice it. But when the cow is killed and skinned, and you look at her hide from the inside, you

The Record Stockman

Grins, Guffaws, and "Dead Pans"—When a Heifer Sells for $20,000!

John E. Owen, Riverside, California (man with book) has just bid in "WHR Lady Lill 15th" at Wyoming Hereford Ranch sale, October 9, 1944. Pandemonium swept the crowd when bidders ran the price up to dizzy figures (page 153).

can see where the original brand was burned over or another line added to it.

"We traced this beef to her rightful owner and paid him the cash from the sale. We also located the person who had changed the brand, and he found it convenient to quit the State."

The Johnson County War

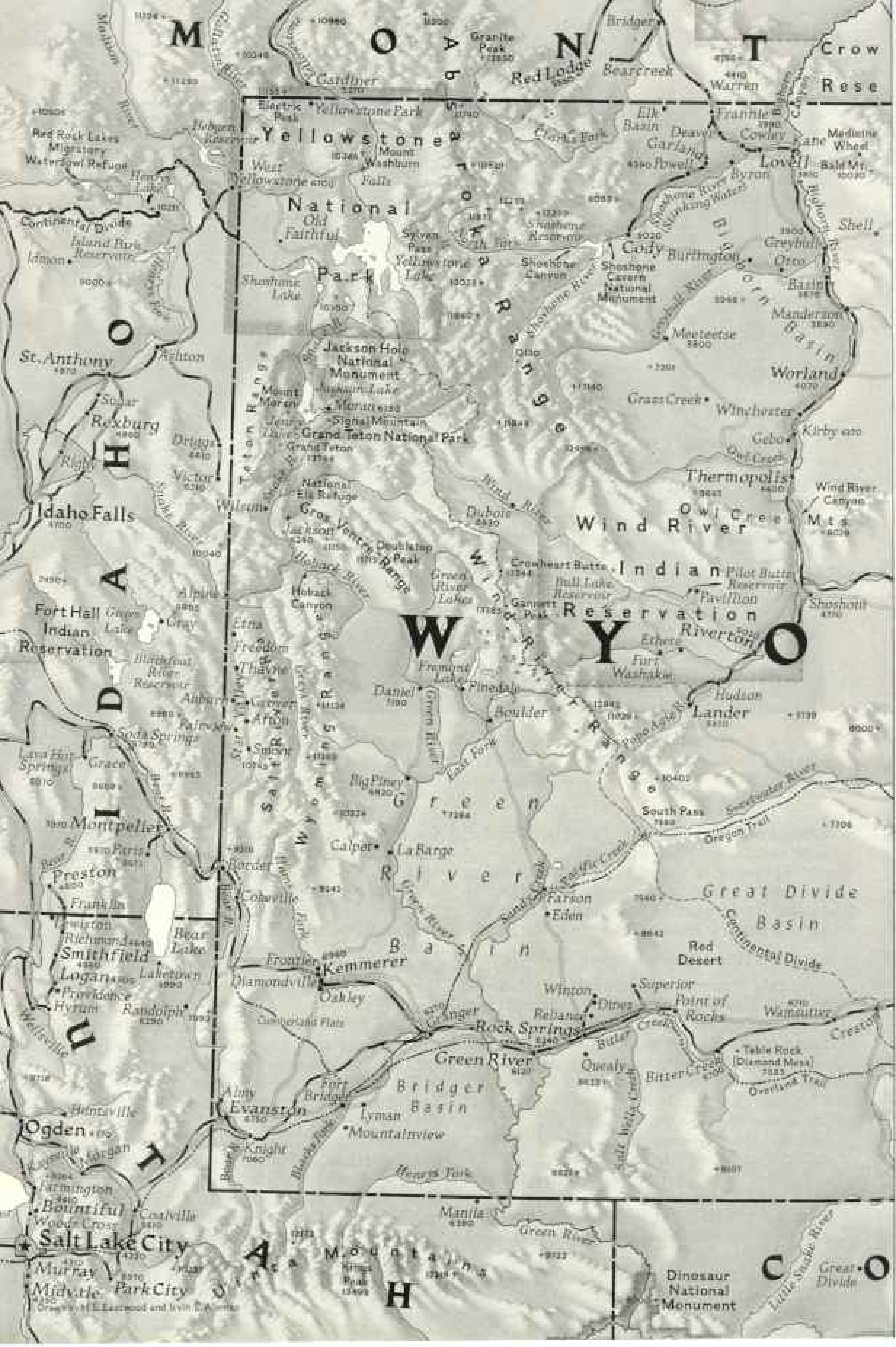
Grimly remembered, but seldom discussed by participants still living, is the oft-described Johnson County Cattle War of 1892. Then tough gunmen were imported from Texas to shoot it out. On a special train, with equipment, ammunition, and provisions, they left Cheyenne for the battleground. Men were killed and a house was burned. Only troops, sent by the President of the United States, halted this drama of the Middle Ages.

I talked with that famous old sheriff, Clayton Danks, of Lander. Once champion bronco-buster, he's shot it out with many a cow thief. But when we asked him to pose with his horse for a picture, he blushed under his 60-year-old sunburn and confessed he owned no horse!

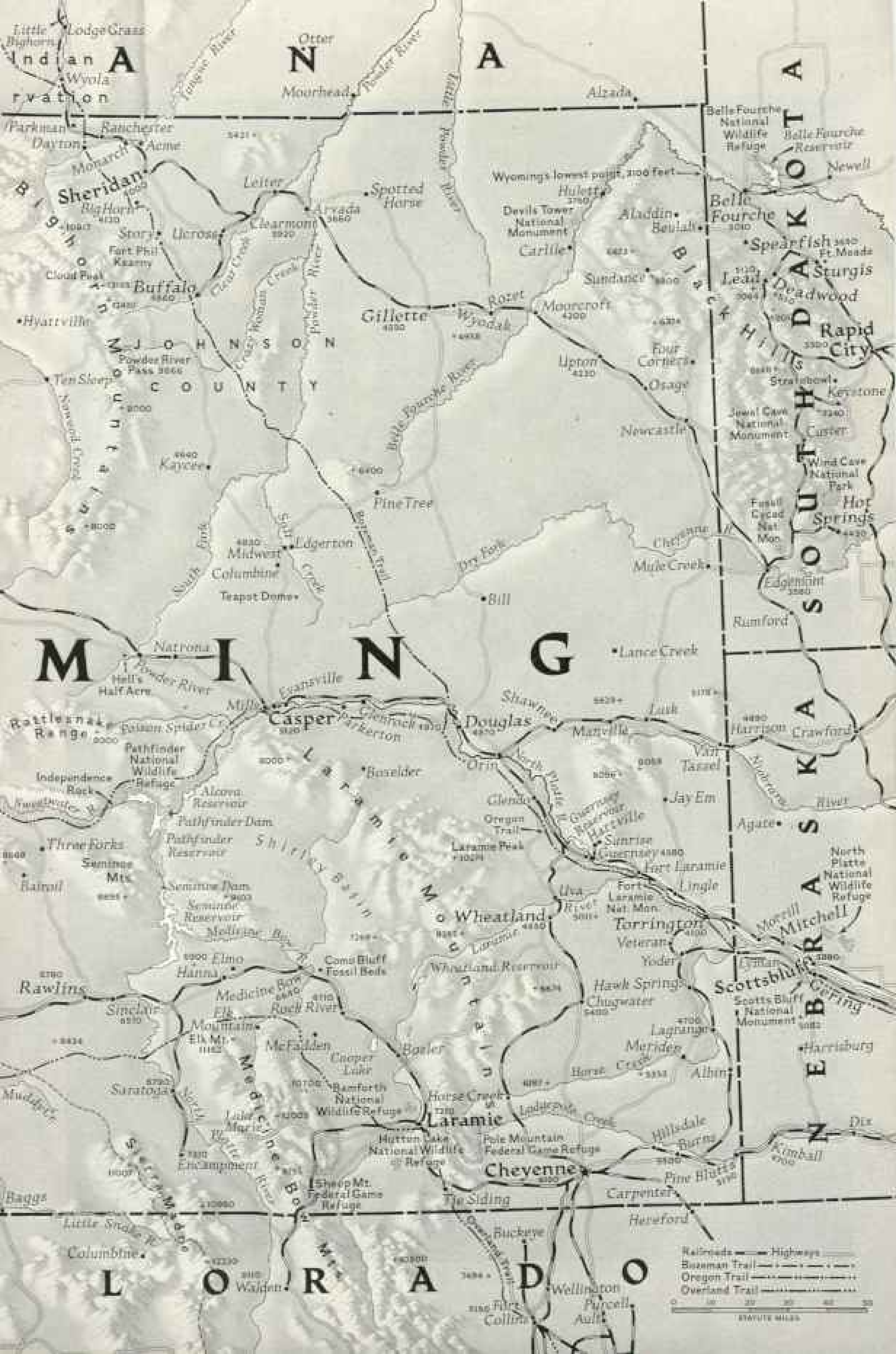
"I have to use a car now," he explained, "because today's cow thieves ride in cars and haul their stolen cattle away in trucks. Yesterday I had to chase a saxophone thief—of all things! He got away in a bus, and on a horse, with no car, I never could have caught him."

What from altitude and lack of water, slightly more than 3 percent of the State (not counting Yellowstone Park) is used for crop production. But Wyoming has about 58 million acres of grass and grazing land (Plate VII).

Favored spots in lower basins grow excellent vegetables. But I've heard that in early days, to discourage "nesters," the cow outfits never allowed any gardens to be planted because they didn't want homeseekers to see that anything but grass would grow here!



MONTANA
IDAHO
WYOMING
UTAH
COLORADO
Yellowstone National Park
Gardiner
Electric Peak
Yellowstone Park
West Yellowstone
Mount Washburn
Old Faithful
Sylvan Pass
Yellowstone Lake
Shoshone Lake
Granite Peak
Red Lodge
Bearcreek
Bridger
Warren
Crow
Rose
Frannie
Elk Basin
Deaver
Cowley
Garland
Powell
Lovell
Byron
Medicine Wheel
Bald Mt.
Shoshone Reservoir
Shoshone River
Cody
Burlington
Shoshone Canyon
Shoshone Cavern National Monument
Greybull
Otto
Basin
Manderson
Shell
Bighorn River
Bighorn Basin
Meeteetse
Grass Creek
Worland
Winchester
Kirby
Gebo
Owl Creek
Thermopolis
Wind River Canyon
Owl Creek Mts
Absaroka Range
Jackson Hole National Monument
Mount Moran
Moran
Signal Mountain
Grand Teton National Park
Grand Teton
Teton Range
National Elk Refuge
Wilson
Jackson
Gros Ventre Range
Doubletop Peak
Dubois
Wind River
Wind River Indian Reservation
Crowheart Butte
Bull Lake Reservoir
Pilot Butte Reservoir
Pavillion
Gannett Peak
Riverton
Shoshoni
Ethete
Fort Washakie
Hudson
Lander
Wind River Range
Popo Agie R.
South Pass
Sweetwater River
Oregon Trail
Green River Lakes
Fremont Lake
Pinedale
Boulder
Daniel
Big Piney
Green River Basin
Calpet
La Barge
Hoback Canyon
Hoback River
Wyoming Range
Salt River Range
Star Valley
Etna
Freedom
Thayne
Auburn
Grover
Afton
Smoot
Alpine
Border
Cokeville
Frontier
Kemmerer
Diamondville
Oakley
Cumberland Flats
Granger
Farson
Eden
Pacific Creek
Sandy Creek
Great Divide Basin
Continental Divide
Red Desert
Superior
Winton
Dines
Reliance
Point of Rocks
Rock Springs
Green River
Bitter Creek
Quealy
Wamsutter
Creston
Table Rock (Diamond Mesa)
Overland Trail
Salt Wells Creek
Bridger Basin
Fort Bridger
Lyman
Mountainview
Almy
Evanston
Knight
Henrys Fork
Manila
Uinta Mountains
Kings Peak
Dinosaur National Monument
Little Snake River
Great Divide
Red Rock Lakes Migratory Waterfowl Refuge
Henrys Lake
Continental Divide
Island Park Reservoir
Idmon
St. Anthony
Ashton
Sugar
Rexburg
Rigby
Driggs
Victor
Idaho Falls
Snake River
Fort Hall Indian Reservation
Grays Lake
Gray
Blackfoot River Reservoir
Soda Springs
Lava Hot Springs
Grace
Montpelier
Paris
Preston
Franklin
Lewiston
Richmond
Smithfield
Logan
Providence
Hyrum
Wellsville
Bear Lake
Laketown
Randolph
Huntsville
Ogden
Morgan
Farmington
Bountiful
Woods Cross
Coalville
Salt Lake City
Murray
Midvale
Park City



M O N T A N A
Little Bighorn
Lodge Grass
Indian Reservation
Wyola
Otter
Tongue River
Powder River
Moorhead
Alzada
Parkman
Ranchester
Dayton
Acme
Monarch
Sheridan
Big Horn
Story
Ucross
Leiter
Clearmont
Arvada
Spotted Horse
Fort Phil Kearny
Cloud Peak
Buffalo
Clear Creek
Gillette
Rozet
Wyodak
Moorcroft
Hyattville
Bighorn Mountains
JOHNSON COUNTY
Powder River Pass
Ten Sleep
Kaycee
Pine Tree
Belle Fourche River
Dry Fork
Little Powder River
Wyoming's lowest point, 3100 feet
Hulett
Devils Tower National Monument
Aladdin
Beulah
Carlile
Sundance
Upton
Four Corners
Osage
Newcastle
Black Hills
Belle Fourche National Wildlife Refuge
Belle Fourche Reservoir
Newell
Belle Fourche
Spearfish
Ft. Meade
Sturgis
Lead
Deadwood
Rapid City
Stratobowl
Keystone
Jewel Cave National Monument
Custer
Wind Cave National Park
Hot Springs
Fossil Cycad Nat. Mon.
Edgemont
SOUTH DAKOTA
Cheyenne R.
Mule Creek
Rumford
Bozeman Trail
Edgerton
Midwest
Columbine
Teapot Dome
Salt Creek
South Fork
Bill
W Y O M I N G
Natrona
Powder River
Hell's Half Acre
Lance Creek
Evansville
Mills
Casper
Glenrock
Parkerton
Douglas
Shawnee
Lusk
Manville
Harrison
Crawford
Van Tassel
Niobrara River
Rattlesnake Range
Poison Spider Cr.
Pathfinder National Wildlife Refuge
Independence Rock
Sweetwater R.
Alcova Reservoir
Pathfinder Dam
Pathfinder Reservoir
Boxelder
Orin
North Platte R.
Glendo
Guernsey Reservoir
Hartville
Jay Em
Agate
Oregon Trail
Laramie Peak
Sunrise
Guernsey
Fort Laramie
Lingle
Shirley Basin
Laramie Mountains
Three Forks
Seminoe Mts.
Bairoil
Seminoe Dam
Seminoe Reservoir
Medicine Bow R.
Uva
River
Fort Laramie Nat. Mon.
Wheatland
Torrington
Veteran
Yoder
Morrill
Mitchell
North Platte National Wildlife Refuge
NEBRASKA
Elmo
Hanna
Como Bluff Fossil Beds
Laramie R.
Wheatland Reservoir
Lyman
Scottsbluff
Gering
Rawlins
Sinclair
Medicine Bow
Rock River
Elk Mountain
Elk Mt.
McFadden
Hawk Springs
Chugwater
Scotts Bluff National Monument
Bosler
Cooper Lake
Lagrange
Meriden
Harrisburg
Horse Creek
Albin
Saratoga
Bamforth National Wildlife Refuge
Medicine Bow Mts.
Lake Marie
North Platte River
Horse Creek
Laramie
Lodgepole Creek
Hillsdale
Burns
Dix
Muddy Cr.
Sierra Madre
Encampment
Hutton Lake National Wildlife Refuge
Pole Mountain Federal Game Refuge
Kimball
Cheyenne
Pine Bluffs
Baggs
Sheep Mt. Federal Game Refuge
Tie Siding
Carpenter
Hereford
Little Snake R.
Buckeye
Overland Trail
Columbine
C O L O R A D O
Walden
Wellington
Fort Collins
Purcell
Ault
Railroads
Highways
Bozeman Trail
Oregon Trail
Overland Trail
0 10 20 30 40 50
STATUTE MILES

© Charles J. Belden

Pronghorn Antelope Running at Nearly 60 M.P.H., Photographed from a Plane Flying 30 Feet above the High Plains

Frank Robbins

Flying Cowboys in Small Planes Drive Wild Horses into Hidden Traps

Fences, cleverly concealed in the mouth of a canyon, form a corral. The best of the horses are broken; others are sold for meat (page 176).

Thomas W. McKnew

Using an Old Wagon as a Bridge, a Frisky Lamb Jumps High and Handsome in Crossing a Foaming Creek

Lambs, unaccustomed to swimming, might easily drown in an ice-cold, swift mountain stream; so a Wyoming rancher improvised this bridge.

Cheyenne, capital and chief city (Plates I, X), stands in the middle of the Warren Ranch. Nearly one-half as big as Rhode Island, this animal empire has 80 miles of private gravel roads, 75 windmills, 75 sheep dogs, and almost 100 miles of telephone lines.

So vast is this kingdom that its manager, Fred E. Warren, has a compass set in his De Soto! Riding with him, we left the made roads and cruised through rolling hills, jumping herds of antelope. Once we let our wheels drift into old ruts of the Oregon Trail, worn by covered wagons a hundred years ago. Over one emigrant grave was a marker, "Emily Patrick, Aged 10."

When Cheyenne Sowed Its Wild Oats

"My father, who was the first governor of the State and served 34 consecutive years as United States Senator from Wyoming, started this ranch," said Fred Warren. "He brought sheep from New Mexico, which meant months on the long, rocky trails through Colorado.

"I was born here and knew this town in its wild-oats days," said Mr. Warren. "I saw the old stagecoaches gallop in from Deadwood, one of them armor-plated against robber attacks. Calamity Jane, Big-nosed George, and the Indian chiefs were then to our folk tales what the James boys and Quantrill's band were to Missouri and Kansas. Not to mention Wild Bill Hickok!

"Once one of America's richest per capita cities, Cheyenne was the wild West goal for adventurers from distant lands. Titled Englishmen also came; some built fine homes here. A New York socialite drove a tallyho.

"Everybody gambled, especially in livestock. That was the biggest gamble of all. In one year you could win or lose a fortune. With no fences or feeding, animals shifted for themselves. Now ranching is on a firmer basis. But, also, you no longer have a gambler's chance to make big profits.

"Early days were rough-and-tumble, but we had fun. One European visitor went down to Denver, felt good, and hired a steam roller to go sight-seeing! One evening he left an 8 o'clock call at his Cheyenne hotel, but the clerk forgot and he overslept. Next night he walked into the hotel lobby with a live rooster under his arm. 'I can depend on *him*,' he said. 'He'll wake me.'"

To Count Sheep, Add Up Their Tails

You're waist-deep in sheep out here. Their voice dominates other sounds.

Sheepherders' white-topped wagons dot the hills, and thousands of trained dogs help herd more than three million sheep. These dogs scamper over the backs of flocks, using each animal as a steppingstone. Some large ranches work from 100 to 175 dogs. Often the herders also use a "tin dog," a string of empty tin cans which they rattle to keep the sheep moving.

To count lambs, when they are "docked," or have their tails cut off, men put the tails in piles of ten, then add up the piles.

And shearing! How long would it take you to catch a nimble sheep, grab a pair of scissors, and take his fleece off whole? Men here do that in from 2½ to 5 minutes, using either hand shears or machine-powered clippers.

Once a year men "mouth" the old ewes: they open their mouths to see if their teeth are still sound enough for use another year. If not, the ewes go to market.

"Touch System" for Judging Wool

To judge rapidly the quality of a sheep's wool, J. A. Hill, Dean of the College of Agriculture at the State University, developed the "touch system," now studied by animal-husbandry students from distant States. Experts trained in this new method, with a touch sense as delicate as a surgeon's or a harpist's, can feel several hundred sheep an hour, as they run through a chute, and estimate the fineness of their wool.

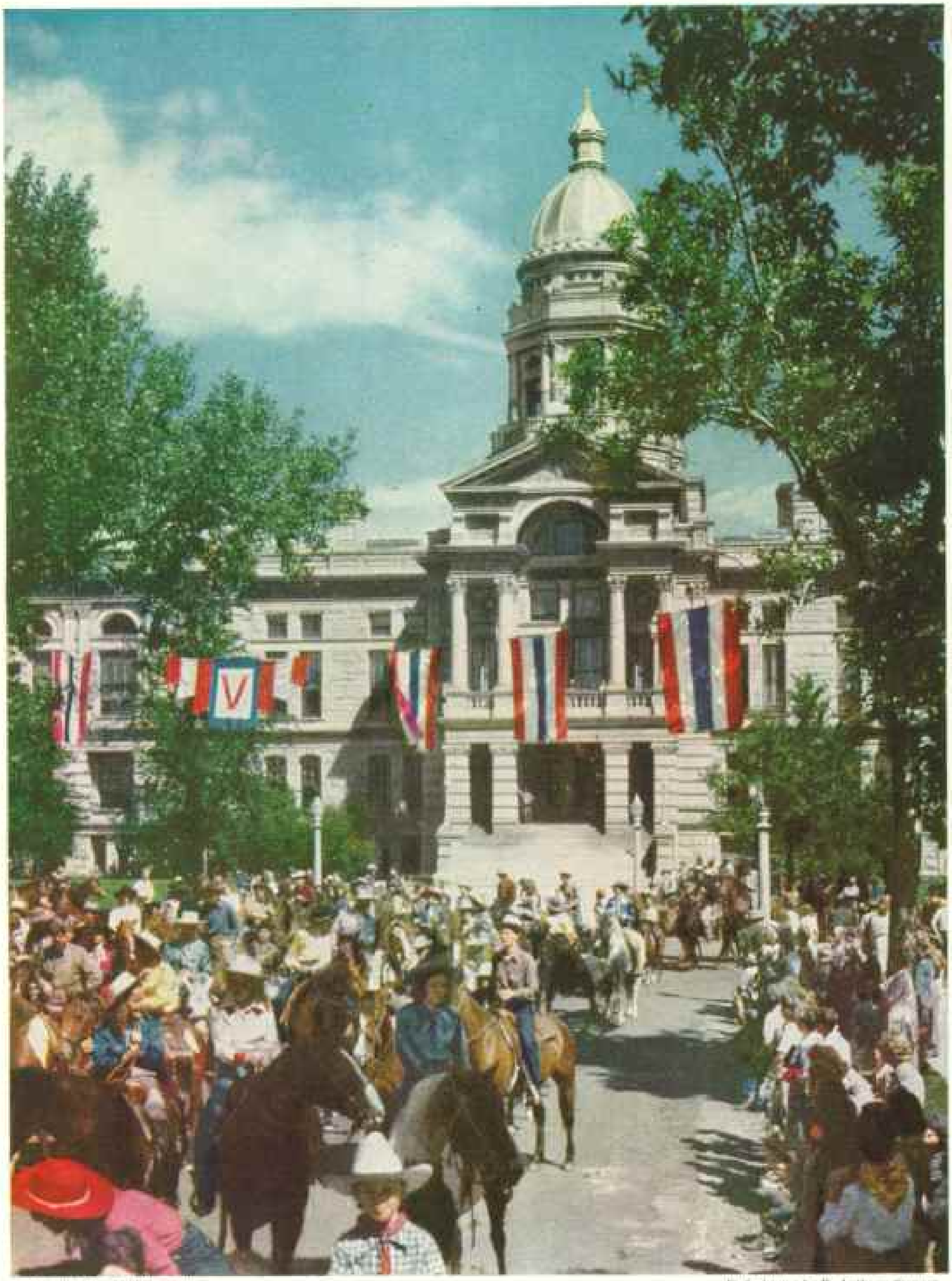
As Abraham drove his flocks from Mesopotamia, so Mormons drove their sheep across these plains. Some came with troops and emigrants, as a ready source of fresh meat. By 1870, despite Indian raids, this land of lush, free grass saw the rise of permanent flocks. Cattle were increasing, also, and feuds raged between cow- and sheepmen. The true story of these bloody wars defies all fiction or imagination.

Poaching on the other fellow's grass, bad political control of the range, and the fallacious belief that steers would not drink after sheep or graze after them, because of an odor left by oil glands in the sheep's feet, all contributed to these bitter stockmen's wars.

In these fights masked men from big cow outfits killed the sheepherders, burned their wagons with sheep dogs still tied to them, and then exploded dynamite among the tightly packed flocks or "rim-rocked" them, which meant driving them over cliffs.

After some particularly atrocious killings known as the "Ten Sleep" murders, Wyoming reformed about 1910 and went all out for law and order. Arrests, trials, and punishments ended feuds. Today, some of the big ranches run both sheep and cattle.

Wyoming is one of the grassiest spots in the Union.



Kodachrome by B. Anthony Stewart

Frontier Days Parade Halts Before Wyoming's Imposing Capitol at Cheyenne

This annual fiesta is a State institution, more than a mere wild West show. Cowboys, Indians, old stagecoach drivers, bearded "bad men," all move in a pageant recalling Wyoming's audacious, romantic yesterdays. The five-day show includes broncobusting, races, Indian dances, and other recaptures of pioneer times.

Kodachrome by B. Anthony Stewart

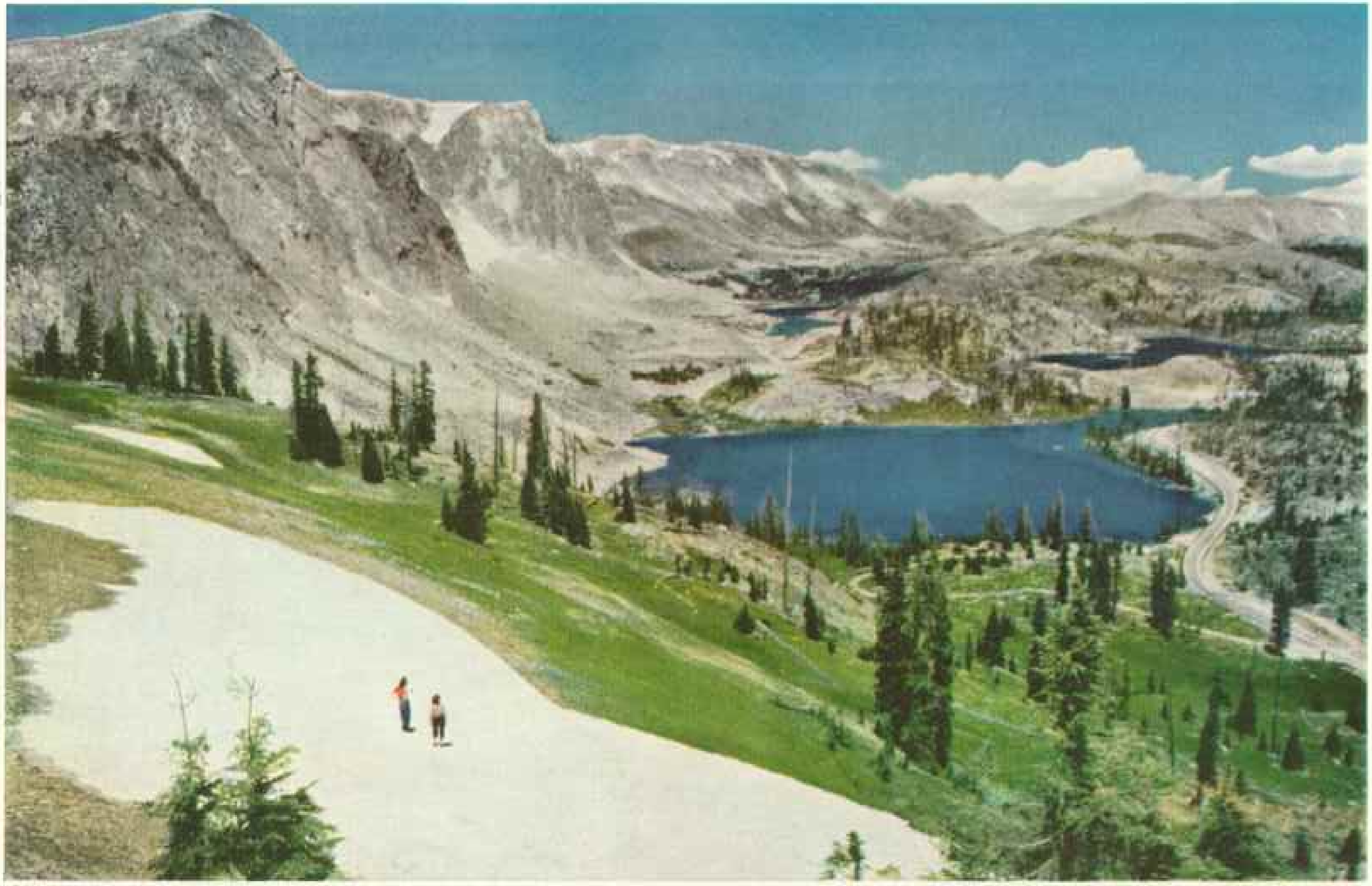
Belly-deep in Purple Sage, Dude Riders from the Charlie Moore Ranch Explore the Red-rocked Badlands of Wind River

More than 100 Wyoming ranches accept paying guests, many of whom have been coming every season for 15 or 20 years. Some return in late fall to go on big-game hunts, guided by local cattle- or sheepmen. Sometimes an Eastern girl falls in love with a guide or a horse wrangler, marries, and settles down as a resident.

Kodachrome by B. Anthony Stewart

Valley Ranch Accordion Players Squeeze Out Western Tunes as Juvenile Guests Sing the Catchy Words

After a hard day on horseback these evening jamborees are happy hours for guests on Wyoming ranches. This season most older boys and girls are in the armed forces or busy at war jobs; so youngsters predominate. Indian pottery, baskets, tiny tepees, rugs, and primitive weapons emphasize the wild West setting.



Kodachrome by B. Anthony Stewart

It's Mid-August, but That Snowbank Still Feels Cold to the Two Girls in Sport Shirts and Blue Jeans

Blue water far below is Lake Marie, in Medicine Bow National Forest west of Laramie. About the lake's edge patches of wild flowers bloom late in summer. Heavy east-west traffic flows over the transcontinental highway which skirts the lake. The girls caught and fried a mess of trout from the ice-cold waters of the lake.

Old Posters Hint at Buffalo Bill's Daring Deeds

Preserved at Cody, named for William F. Cody, these lithographs were some used by Buffalo Bill to advertise his "Wild West Show." A hero-worshiper at upper left holds an old curb bit; before him is a pair of pearl-handled "six guns" once worn by this famous scout and buffalo hunter.

Kodachromes by R. Anthony Stewart

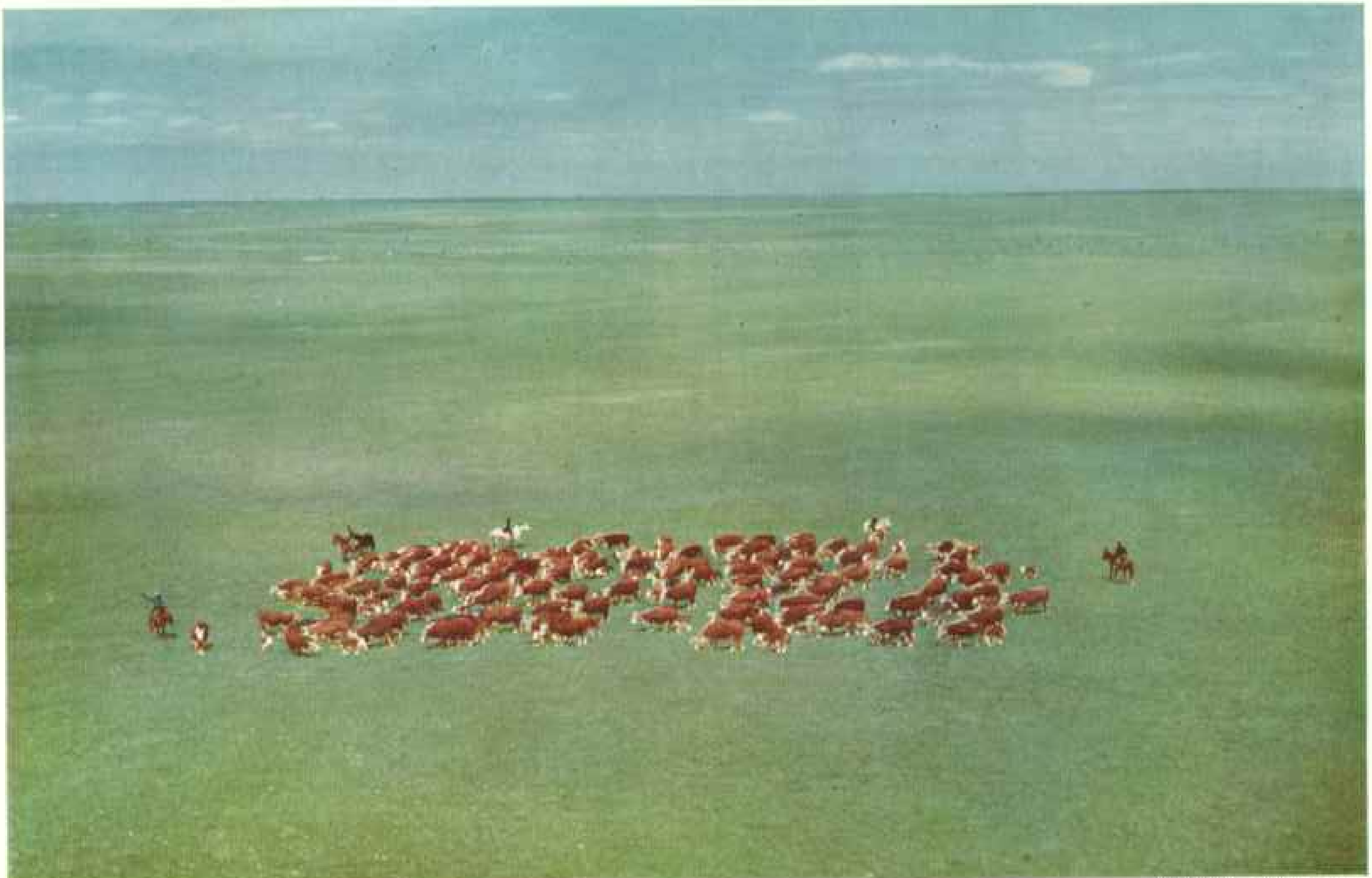
Every Wyoming Visitor Should See the State Museum

It is at Cheyenne and is to Wyoming what the National Museum is to the United States. Here, at top, is the State flag (Plate XIII). Below, two moderns flourish old-style pistols, armed as were Calamity Jane and Cattle Kate, famous women wildcats of pioneer Wyoming.

Kodachrome by B. Anthony Stewart

Avalanches, Audible for Miles, Now and Then Roar Down the Steep Slopes of the Alplike Tetons, Rising above Jackson Lake

Force and friction are so great that rock is ground to fine dust which rises and hangs like a cloud. These colossal snowslides break down forest giants, kill wild animals, and even have buried people. Viewed from the foot of Signal Mountain.



Kodachrome by B. Anthony Stewart

Neither Tree nor Bush Breaks the Infinite Stretches of This High Wyoming Range, Empty Except for Cattle

Spring roundup on famous Wyoming Hereford Ranch near Cheyenne permits what cowboys call "mothering up." Each cow seeks out and walks with her own calf and then can be separated from the rest of the big herd. Small specks indicate still more cattle, and at left are a windmill and water tank.

Railbirds Smile as Unhorsed Riders "Hit the Grit" in a Bucking Bronco Contest

This husky, horsy sextette is part of the ringside crowd at a wild West show in Lander, queen city of the Shoshoni Indian country. They have a right to laugh, for each may ride a bronco as well as anyone in the ring.

 Kodachromes by B. Anthony Stewart

Those Good-looking Girls Are Turning Elk Steaks

Meat! Elk and antelope! No points! Each year the Game and Fish Commissioner supplies State University students with wild meats for a steak fry. Wyoming game helps meet the demand for fresh meat.

"We have about 250 kinds!" says Dr. A. F. Vass, agronomist at the State University in Laramie. "Here," said Horace Greeley, "you can raise a steer as cheaply as you can raise a chicken."

"Blue grama takes the place of buffalo grass of the Great Plains to the east," states Dr. Vass. "Wheat grasses rank high as forage producers. Western wheat grass, known as bluestem, is one of the most useful species; needle grasses, blue grasses, and bromes are also important, while sedges and rushes make up much of the forages in wild meadows.

"In the past 50 years, constant grazing here has made little change in the grass crop or in the number of animals an area can support.

"Farsighted ranchers—and they must be that to stay in business—do not overgraze. Most stockmen do some winter feeding here, or send their animals on to the Corn Belt, because the market demands corn-fed beefs.

"Yet steers from our mountain meadows, with no feed other than native grass, often top the market. Allen Geddes, of Laramie Valley, got $16 per cwt. in the fall of 1943 for grass-fat steers that weighed close to 1,500 pounds. They had never tasted grain or high-protein concentrates.

"Cattle prefer true grasslands, whereas sheep make better use of sagebrush ranges and high mountain areas with weeds and browse types of vegetation. Our Red Desert, for example, affords winter home and feed for about 1,000,000 sheep."

Poisonous plants kill much livestock. In a "death garden" at Laramie, scientists grow larkspur, lupines, locoweed, and other deadly plants for study. But how to keep animals from eating them is still a problem.

Dry Farming and Wind Erosion

Dry farmers, such as those in the section west of Torrington, have learned much about how to reduce wind erosion. They seed a strip of wheat across a field at right angles to the prevailing wind, then let a similar parallel strip lie idle for a season. They alternate these strips. This keeps wind from blowing soil away at the rate it would in a wide, open field that was all plowed. But it's still "root, hog, or die" on dry farms, to make a go of it; to get by, most farmers must also run a few head of cattle or sheep.

More water is Wyoming's great need. The greater part of the precipitation comes as snow. "The deeper the snow, the better for us," says State Engineer L. C. Bishop.

"Chief among our reclamation developments are the Seminoe, Pathfinder, and Shoshone Reservoirs. There's also the Alcova, Bull Lake, and Pilot Butte. We irrigate about a million and a half acres, but most of it needs more water. About 90 percent of this has been developed by individuals and private corporations.

"Late surveys by U. S. Army Engineers and the Reclamation Service show these acres can be fully supplied and about a million more acres reclaimed by construction of sufficient storage reservoirs."

Warm chinook winds sweep from the Rockies in winter, a blessing to all creatures that graze. Ice melts in the streams, so stock can drink. High snowbanks fade, exposing the grass, which looks dead but is still nutritious.

Wyoming has short, pleasant summers, but cold, windy winters. "It blows so much here," people say, "that even on calm days, from habit, men reach up to hold their hats and lean forward when they open the front door to go out, expecting, of course, to be half swept off their feet by a howling blast."

In winter, mail is sometimes carried over the pass from Victor, Idaho, to Jackson, Wyoming, on sleds drawn by horse or dogs. I heard of one farmer who was hauling a load of hogs to town when a blizzard came on. To keep from freezing to death, he crawled into the wagon bed and squeezed down among the warm, fat hogs.

Summer hailstorms may strip leaves from trees and destroy gardens. One storm broke so many windows in Cheyenne that carloads of new glass had to be brought from Denver.

Beans, potatoes, sugar beets, corn, berries, and some fruits flourish lustily in rich irrigated lowland basins. Corn and potatoes are dry-farmed extensively, but most of the State is too arid and cold for any crop but grass.

Yet not all wealth is above ground.

Coal, Iron, and Oil under the Grass

From Sunrise Mines, near Guernsey, more than 20,000,000 tons of iron ore have rolled downhill to Colorado smelters.

Of our known coal, Wyoming has an estimated 600 billion tons.

Mines at Rock Springs are owned by the Union Pacific Coal Company. In 1943 it mined enough coal throughout the State to load a train 1,168 miles long.

Rock Springs is polyglot. In its winding K Street you see French bakeries, Mexican chile parlors, Greek candy shops, Chinese laundries, and Jewish markets.

This vast underground coal world, with 90 miles of railroad, is all electrified. Workers wear safety hats, goggles, and shoes, and no

John A. Hooker

Sunfishing, Coming down with Forelegs Stiff, an Outlaw Horse Seeks to Crack the Bones of His Hated Rider

Such animals know all the tricks to unhorse a rider, even to rearing up and falling over backward and thus trying to crush him. Here Ned Ferrero, of rodeo-circuit fame, tries for prize money in the 1944 Cheyenne Frontier Days contest. Riders often compete bareback.

matches may be lit underground. Water is piped to eliminate explosive dust.*

The "duckbill," a mechanical loading device invented here, is used now in many places where coal is mined. Under Lend-Lease, duckbills have been sent to England to speed up mining.

Here the Union Pacific Coal Company trains troops of Boy and Girl Scouts in first-aid work, using the manual of the U. S. Bureau of Mines.

In northeast Wyoming, near Gillette, is a strip mine, the Wyodak, with a vein 65 to 90 feet thick (page 175). In this vicinity, many mines are on fire and have been for years. Flames and smoke rise from fissures into which animals sometimes fall. It made me uneasy to stand by and see our world on fire, as if hell itself were blazing just below!

Oil has paid Wyoming millions.

Mormon emigrants used oil from springs near Evanston for medicine, for axle grease, and to treat the sore backs of their galled jades.

"Our greatest annual yield was in 1923,"

* See, in the National Geographic Magazine, "Coal: Prodigious Worker for Man," by Albert W. Atwood, May, 1944.

says Dr. Horace D. Thomas, State geologist, "when the Salt Creek field alone flowed 35 million barrels. Since then this field has declined. Today, Lance Creek produces most. New developments in the Elk Basin field, 15 miles north of Powell, from which new pipelines are laid, are expected to make it the State's largest producer.

West of Rawlins, near U S 30, lies an odd formation known as Table Rock, or "Diamond Mesa." Once two adventurers brought precious stones here from Holland and "salted" the mesa. Then they told of their "discovery" and brought prospective buyers out, blindfolded. They fleeced more than $500,000 from their victims. The fraud was detected when one member of a geological survey party kicked up from an anthill a diamond that had been cut.

Today the State has been well prospected. It has had some gold rushes, mined some fat fortunes, and then seen its mines fade out and its roaring camps turn to ghost towns.

To geologists, however, all these peaks, deep canyons, hot springs, burning coal mines, bentonite and salt deposits, coal, oil, and snowslides still make a happy hunting ground.

Through its university extension work, the State studies itself—not only its rocks, but its forests, its livestock, its grasslands, agriculture, and people.

Wyoming Improves Its Mind

"Since the days of Edgar Wilson (Bill) Nye and his *Laramie Boomerang*, our cow-country press has been much quoted," said State Superintendent of Public Instruction Esther Anderson. "Life on the windy plains stirs the mind. Our State motto is *Cedant Arma Togae* (Let Arms Yield to the Gown).

"So eager is the State for education that in 1943 it maintained 42 schools for only one pupil and 91 schools for only two. But it's hard to keep teachers. Good-looking ones, out from the East, soon are snapped up in marriage.

"Our State was first to have woman suffrage, by a Territorial law passed in 1869. We had the first woman justice of the peace, the first woman governor."

Forty-three years ago the Young Men's Literary Club was born in Cheyenne. Some of the original "young" members still attend. Governors, senators, Supreme Court justices, famous doctors, editors, and educators, as well as cattle kings and sheep barons are, or have been, members.

Subjects debated range from "Bible Literature" to "The Business of Horse Racing" and the "Esthetic Value of Bobbed Hair and Women's Slacks." Sessions, held in the public library, are known for their intellectual jousting.

The night I was a guest the theme was not Churchill, Stalin, or Chiang Kai-shek, but Christopher Columbus. They really brought him to life!

State a Big Outdoor Zoo

"Moving two by two," I said to Game and Fish Commissioner Lester Bagley, "how long would it take all your wild creatures to pass in review?"

"Longer than it took Noah's! We have approximately 165,000 meat-bearing animals alone. These include about 75,000 deer; 54,000 antelope; 30,000 elk; 3,500 moose; 2,500 bighorns, or Rocky Mountain sheep; 1,500 black bears; and 460 grizzly bears.

"In 1944 hunters took some 22,600 head, and families filled their lockers with game steaks, soup bones, and roasts.*

"We have 20,000 miles of streams and 130,000 acres of lakes, swarming with 83 kinds of fish. We say out here that if you have that tantalizing desire to drop a fly on a dime-sized spot and haul in $10 worth of trout, or like to troll for fish the size of fence posts, or just lie in the shade and dunk a worm, this is the place for you!

"Of beaver and otter, we must have 45,000. Last year we trapped 7,145 beavers, their skins bringing $39 each. Of game birds, counting sage hens, other grouse, and pheasants, there must be 100,000—nobody knows but the hawks, bobcats, and coyotes.

"It's the slick, paddle-tailed, innocent-looking beavers that drive game wardens crazy. When beavers build dams in irrigation ditches and swamp farmers' meadows, we have to trap them and move them to other streams. Then they often return where we got them and renew their devilment. One old fellow, starting to walk back, lost his way and wound up in a far-off airplane hangar, where a pilot found him, blinking in a dark corner.

"Magpies irk us, too. They steal other birds' eggs. In low willows and cottonwoods they build stick nests, often two or three feet across. Near one nest we found a pile of 390 pheasant eggs the magpies had stolen. All about were shells of hundreds of other eggs they had already eaten.

"Well-meaning people often get mauled in Yellowstone Park by fooling with the bears that come out and climb on their running boards to beg for food. One man milked a moose and got kicked. Another hitched an

* See "Lords of the Rockies," by Wendell and Lucie Chapman, in the NATIONAL GEOGRAPHIC MAGAZINE, July, 1939.

A Mammoth Steam Locomotive Bucks a Grade Eastbound Toward Wyoming's Continental Divide

What a monster, compared with the wood-burning engines that wheezed across the Plains in the late 1860's! This Union Pacific "4,000 class" locomotive alone weighs 2½ times as much as a whole train in Golden Spike days. Transcontinental traffic through Wyoming is so heavy that from a hilltop on the Continental Divide you may see a steady stream of trains crawling across the Plains (page 176).

Staff Photographer B. Anthony Stewart

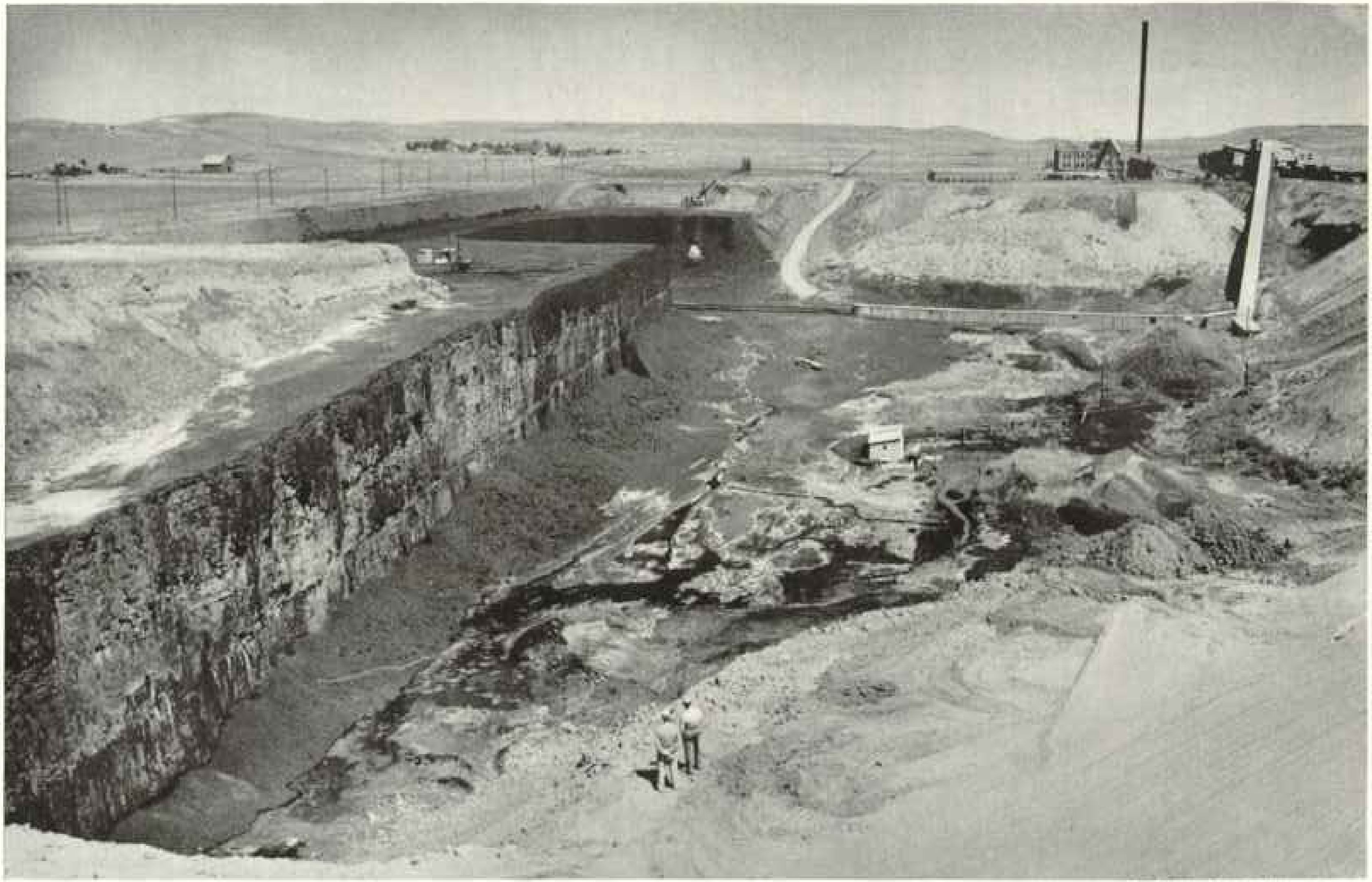
Past This "Register of the Desert," or Independence Rock, Runs the Great Trail over Which Swarmed Westbound Emigrants

Brass tablets set on the turtle-shaped rock honor the memories of pioneers, missionaries, and others. Unfortunately, some of the plaques and freshly painted names obliterate historic records of hundreds who cut their names in the stone nearly 100 years ago. Often Easterners come to scan this directory, seeking relatives who disappeared into the West long ago. With plenty of water and grass, this was a popular camping spot; hereabouts whites fought off Indian attacks and graves are thick.

Staff Photographer B. Anthony Stewart

Like an Idealized Movie Set, Wyoming Hereford Ranch Lies in This Fertile Valley South of Cheyenne

All over the taurine world, breeding stock from this model ranch is known for its part in building up better herds. Few ranches are more beautifully laid out or completely equipped. Besides windmills, silos, farm machinery, feed lots, hay barns, cowsheds, etc., it also has its own veterinary department, equipped with every aid for the breeding and development of better white-faced cattle. Girl rider at left is a veterinarian's daughter; the other is the daughter of a ranch foreman.



Staff Photographer B. Anthony Stewart

Wyoming's Enormous Open-pit Coal Mines Are Among the Wonders of the Mining World

The vein in background, 90 feet thick, lies near Gillette. Coal is loaded by steam shovels and shipped out by trainloads. Underground mines owned by the Union Pacific are worked about Rock Springs, in southwest Wyoming. Machinery and mining methods developed here have been adapted to Great Britain's deep coal mines.

elk to a buggy. It ran away, threw the man's wife out, and kicked the buggy to pieces. So when a Hollywood movie outfit wired me for a dozen elk to use as reindeer in a Santa Claus picture, I said no. You couldn't train that many to work together; they're hard to handle.

"Bow-and-arrow fans get a crack, too, at our wild animals. We've set aside certain areas where only archers are permitted to hunt."

Flying Cowboys Use Planes in Wild Horse Roundups

Wyoming chases wild horses with airplanes. Frank Robbins, of Glenrock, is in the business.

"We hunt in southwest Wyoming, where horses run wild with no fence for 100 miles in any direction. It's a daredevil spectacle," Robbins says, "to see the plane zoom at a galloping herd and head it into our cleverly hidden trap. Our corrals enclose about 35 acres and stand at the fork of two deep ravines which make a natural trap (page 159).

"Wild horses make good saddle or work animals. Because of the independent, self-reliant way they've lived, they seem to have better minds than domestic horses.

"Older animals I sell to buyers who turn them into glue, dog food, rations for mink and fox farms, or feed for young fish in State hatcheries."

Once wild beasts 70 feet long ate grass here. Imagine a lizardlike giant rearing on its hind legs to peer into fifth-floor windows of the Plains Hotel in Cheyenne! Only the timing is wrong in that fancy. Where sheep and cattle now graze, great dinosaurs also used to feed, back in Jurassic times.

"I live in the world's oldest house," says Edward R. Boylan, of Como Bluff. "It's built of petrified dinosaur bones that may be more than 150,000,000 years old."

From near-by quarries, and from others near Greybull in Bighorn Basin, have come carloads of such prehistoric animal bones. Shipped to museums far and near, they will be reconstructed in skeleton form.

Indians long delayed the white settlement of Wyoming, which was not admitted to the Union till 1890. Singing "Oh Susanna!" and with rifles cocked for Indians, hordes of Westbound emigrants had crossed the State on the Oregon Trail after 1843; yet it has been estimated that only some 400 whites, counting trappers, lived here when Lincoln moved to the White House.

Custer died to help Wyoming. To the last man, he and five companies of his 7th Cavalry command were butchered by the Sioux, June 25, 1876, on the grassy slopes of Montana's Little Bighorn. That tragedy was a milestone in the history of white settlements in Montana and Wyoming.

Stunned by the Custer Massacre, Uncle Sam sent enough soldiers into the Rocky Mountain country to halt more major Indian outbreaks.

Building of the Union Pacific Railroad in 1867-8 was a spectacular scene in the astounding drama of this frontier State. Buffalo scratched their sides against the new telegraph poles and thus pushed them down. Indians tore up the track, fired wooden culverts, killed section hands; in primordial ignorance they stretched rawhide ropes across the track, with a dozen bucks holding each end, trying to stop the onrushing train. Imagine how grunting Indians cartwheeled over the prairie when the engine hit that tightrope!

Today, other railroads also serve these grassy plains. At Lander ends a branch of the Chicago and North Western. North across the State goes the Burlington, to haul out livestock, coal, oil, wool, beet sugar, and beans and to unload goods and many visitors for dude ranches and the parks.

Yet, because people are so few, the State uses only 2,000 miles of track, as against nearly 9,000 in Kansas, which has about seven times as many people.

I sat on the Great Divide west of Cheyenne and watched Union Pacific trains pass at the rate of more than 75 a day. Then I began to realize what that phrase "transcontinental railroad" means. This double-track line is like an endless belt, hauling goods east and west.

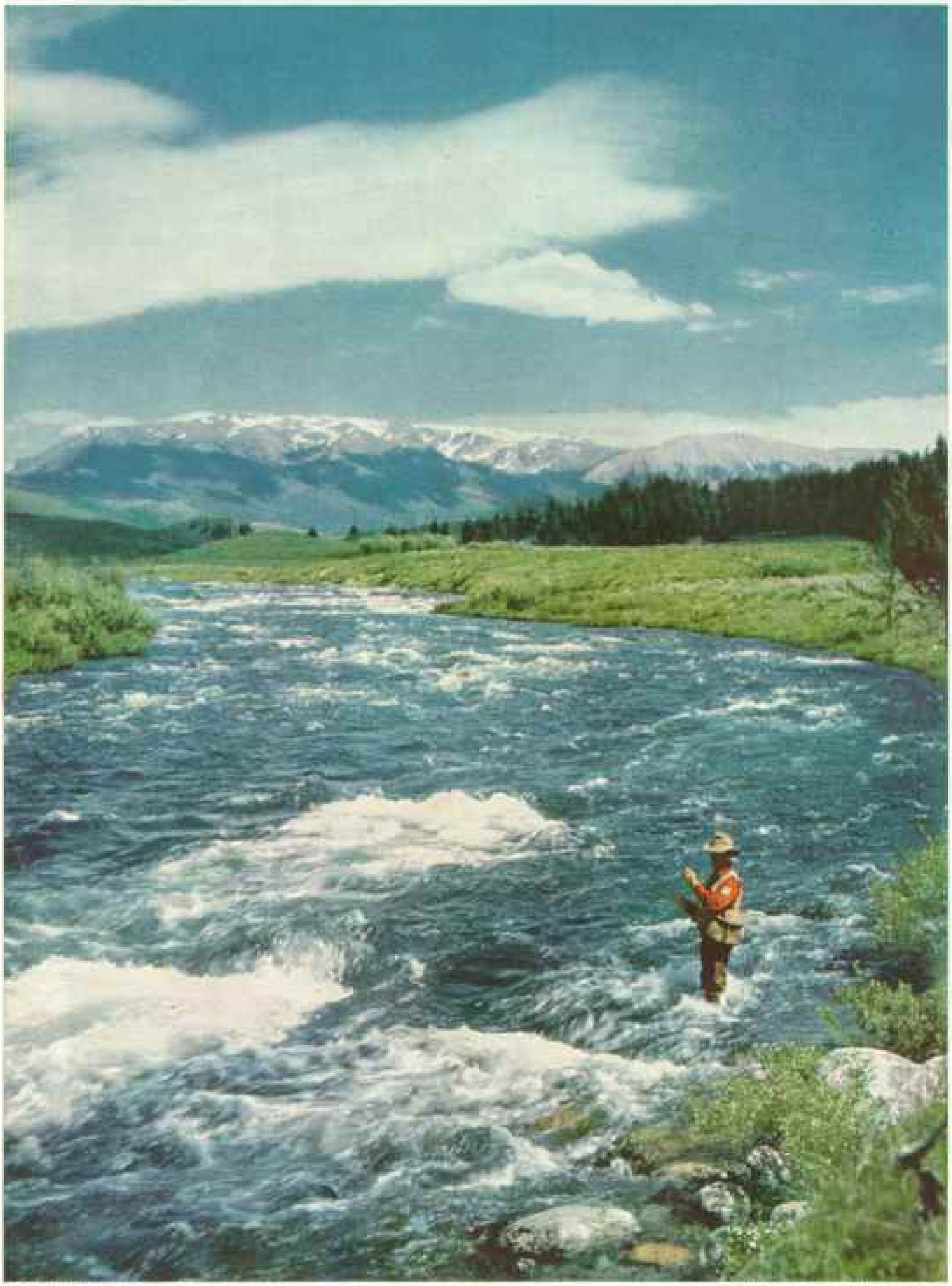
From my lookout I saw from five to ten trains at once. Big as their powerful engines are, at a distance they yet seemed dwarfed against this Mongolianlike vastness, dwarfed as caterpillars crawling on a polo field.

Famous Trails into Wyoming

On their expedition Lewis and Clark (1804-06) didn't see Wyoming; they passed north of it. In 1807 one of their men, John Colter, traversed the Yellowstone country. Later, Indians almost killed him, but he escaped, naked. When he told of geysers and boiling springs that would cook fish, nobody believed him.

But they believed what he said about beaver, and it was trappers who first prowled this Promised Land. John Jacob Astor's fur-trading adventurers came in 1811. A few years later, the British North West Company (absorbed by the Hudson's Bay Company in 1821) sent its men here. So did other fur companies.

Beaver grew scarce by 1840. Trappers and "mountain men" moved on. But migration to Oregon had begun.



 Kodachrome by B. Anthony Stewart

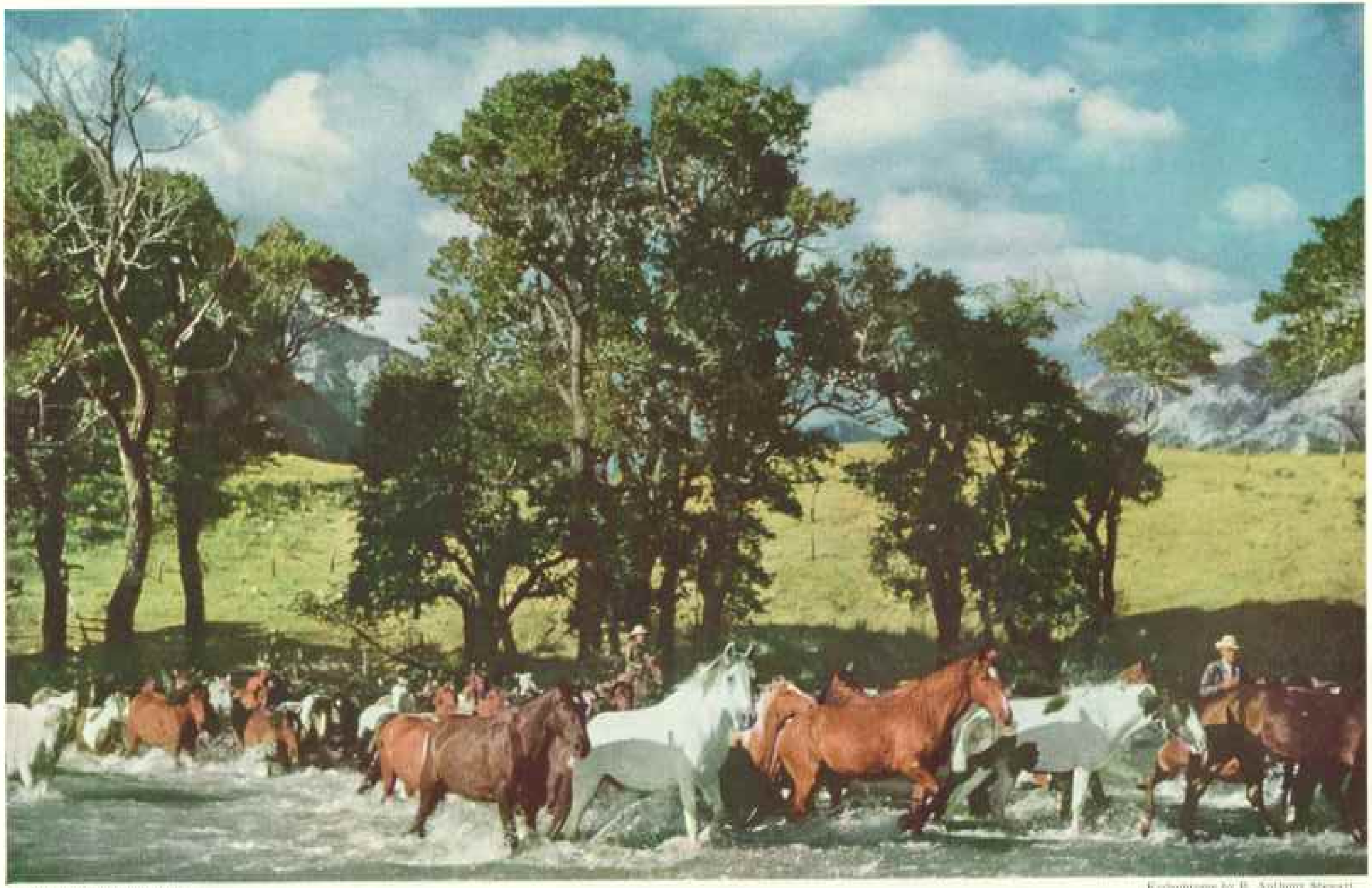
"Even the Weariest River Winds Somewhere Safe to Sea"

For 730 miles Green River waters froth and tumble down to join the wild Colorado in Utah; thence they foam through Grand Canyon, fall over Boulder Dam, loaf along through deserts, and finally reach the Gulf of California, below Yuma. Big trout feed here in the cold rapids below snowy Wind River Range.

Kodachrome by B. Anthony Stewart

"Grab His Tail!" Yells a Cowboy, but This Bull-busting Buckaroo an Instant Later "Smelled Corral Dust" at Cheyenne's Rodeo

Riding such a Brahman bull, with nothing to hold fast to but a loose rope about its belly, is no easy stunt. Though Brahmans grow fat, and off stage look lazy, the trick bulls come to life in the arena. A tail shot from an electric gadget sends them through the gate jumping high, wide, and handsome.



Kodachrome by B. Anthony Stewart

In Wyoming Nobody Ever Sings "The Old Gray Mare, She Ain't What She Used To Be"

Why? Because this cow country needs thousands of mounts to herd its numerous cattle. Dude ranches, too, could not exist without horses. Here, in a morning roundup, sleek horses that were out for night grazing trot in to be saddled for Valley Ranch dudes' daily canter.

Reductions by R. Anthony Stewart

Rockaby Baby, Hung on the Wall;
When the Hook Breaks, Baby Will Fall!

Bright-eyed Shoshoni mama embroiders belts, gloves, and moccasins for sale at near-by Fort Washakie. Today's Indians own radios, tractors, motorcars. They hunt now with rifles, not with bows and arrows.

Kodachrome by Charles J. Belden

Living Models Pose to Form the Great Seal of Wyoming

Adopted in 1893, the seal carries the draped figure of a woman holding an Equal Rights banner (Plate V). Wyoming was the first State to grant votes to women. The men represent livestock and mining.

© National Geographic Society

Kodachrome by B. Anthony Stewart

"Now Don't Get Your Finger Caught in Any More Beaver Traps!"

Shoshoni Indians enjoy good medical care at Fort Washakie clinic. Charlie, youngest son of old Chief Washakie, gets a finger bandaged while his squaw, Ellen, holds his hat.

Kodachrome by B. Anthony Stewart

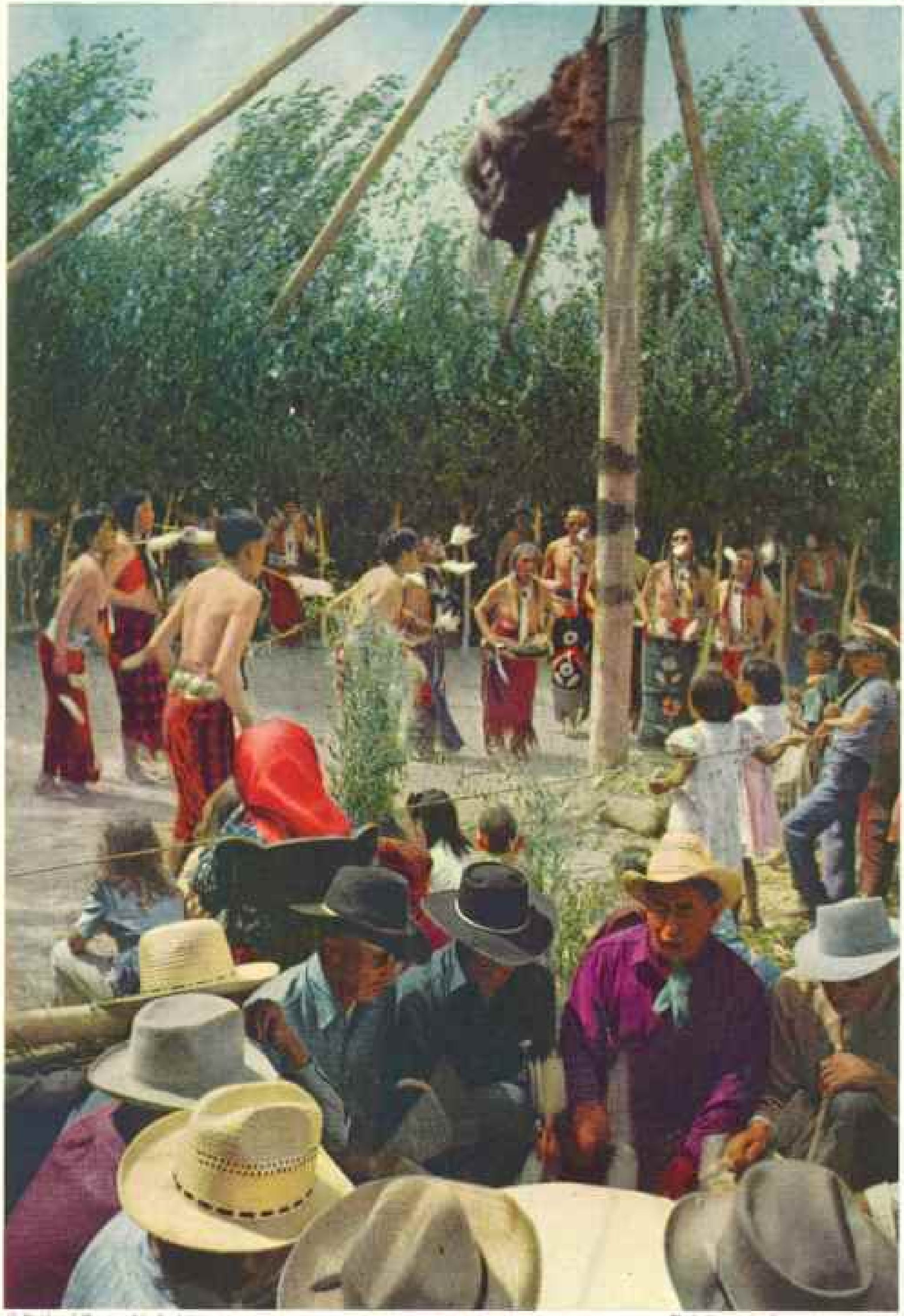
After Branding, Whitefaces Bawl, Stamp, and Snort Their Bovine Way to Lush Jackson Hole Grasses

So many elk troop down from mountain pastures in winter that farmers here build high fences to guard their haystacks against the marauders. For years this isolated "Hole" was the hiding place of outlaw bands. Now, in peacetime, visitors swarm to fish, ride ranch horses, and admire the majestic Tetons.

Kodachrome by B. Anthony Stewart

Much of Wyoming Is Sprinkled Thick with Gravel Deposits, Useful Now in Building Fine Highways and Railway Surfacing

Here a contracting crew for the State Highway Department sifts sand and gravel for road work. Flat-topped Crowheart Butte rises in the background. Along many lonely but smooth hard roads, antelope, often by scores, may be seen galloping over the plains, their "flags," or white posteriors, bobbing up and down.



 Kodachrome by B. Anthony Stewart

Hideously Painted, Shoshoni Sun Dancers Prance and Toot Their Eagle-bone Whistles

For three days and nights, resting now and then but abstaining from all food, they shake rattles, blow monotonously on their whistles, and dance with shuffling steps up to the buffalo head and back again. Old bucks beat drums, squaws chant prayers for rain, crops, and now for the safe return of Indian boys fighting overseas.

Except the Santa Fe Trail through New Mexico, most important pioneer paths across our West ran through Wyoming. The Pony Express, the Mormon, and the California Trails roughly paralleled the Oregon Trail, while the Bozeman Trail veered northward. Across the southern part of the State ran the Overland Trail.

Looming biggest in history is, of course, the original Oregon Trail, first emigrant path broken from Missouri to the Pacific Northwest.

Modern highways in places follow this Oregon Trail, identified now by markers. Other sections of it, fenced in by ranchers, remain visible as deep ruts across the pastures (page 188).

Starting from Missouri River points, this trail enters Wyoming near abandoned Fort Laramie.

Thence it runs up the North Platte River to bustling Casper, out past historic Independence Rock, through South Pass on the Continental Divide, southwest to Fort Bridger, and then northwest into Idaho, and so on to the Pacific Northwest, a distance of more than 2,000 miles.

Before railroads came, more than 300,000 emigrants and gold seekers had gone west over this path.

Graves line the trail. But pioneers quit burying their dead beside the road when they found that Indians dug them up to get their clothes. Instead, they buried them in the middle of the road, where wagon tracks soon hid all signs of a grave.

To cross a deep river, these emigrants often unhitched their teams and swam them across; then they calked their wagon beds and floated the wagons over, full of women, children, and goods, like ferryboats.

To get down over a steep cliff, they lowered the wagons with ropes; sometimes they even had to kill steers and skin them to make the ropes!

Souvenirs of Oregon Trail

To this day, people pick up pieces of wagon wheels, plows, or stoves, and rusty weapons and other jetsam from this mass migration. I found an iron ring off the end of a singletree.

Independence Rock, beside Sweetwater River, was a favorite camp site (page 173). On the rock you read the names of hosts who passed this way; it was a directory of emigrant parties, historic Army men such as John C. Frémont, and missionaries. Beside this "great rock in a weary land" they rested, repaired wagons, washed clothes—and heard the whoops of savages.

Siren alarms sounded the day Cameraman Stewart and I were there. From Casper came the ambulances, to pick up still more casualties of the Oregon Trail, this time victims of a bus wreck.

Indians Left Their Mark

Stinking Water, Poison Spider Creek, and Ten Sleep are Indian place names. Several great tribes hunted here; now only about 2,600 Shoshoni (Shoshone) and Arapaho remain; they live on a reservation at the base of Wind River Range.

Most permanent local monument to Indians may be the tombstones over graves of their white victims and the tablets that commemorate their battles with American soldiers, as at the site of Fetterman Hill Massacre near Sheridan, where Indians wiped out 81 officers and men from Fort Phil Kearny.

Stewart and I saw the Shoshoni's midsummer Sun Dance.* For three days and nights squaws chanted, old men beat drums, and nearly naked young men, their bodies painted, danced about a pole on top of which was hung a buffalo head (Plate XVI). This dance, with all its tribal incantations and meanings, is a prayer to the sun for many things, from rain to the safe return of young Indians now in the armed forces.

We saw them carry in a squaw who was ill and lay her under the buffalo head. "Why do they do that?" I asked of Zeem, an Indian girl.

"To pray for her, so she will get well."

The late Dr. John Roberts, Episcopal missionary, served these Indians more than 60 years. At his Wind River Mission he told me, "I translated much of the Book of Common Prayer and the Gospel of St. Luke into Arapaho."

Crossed Tomahawks Her Coat of Arms

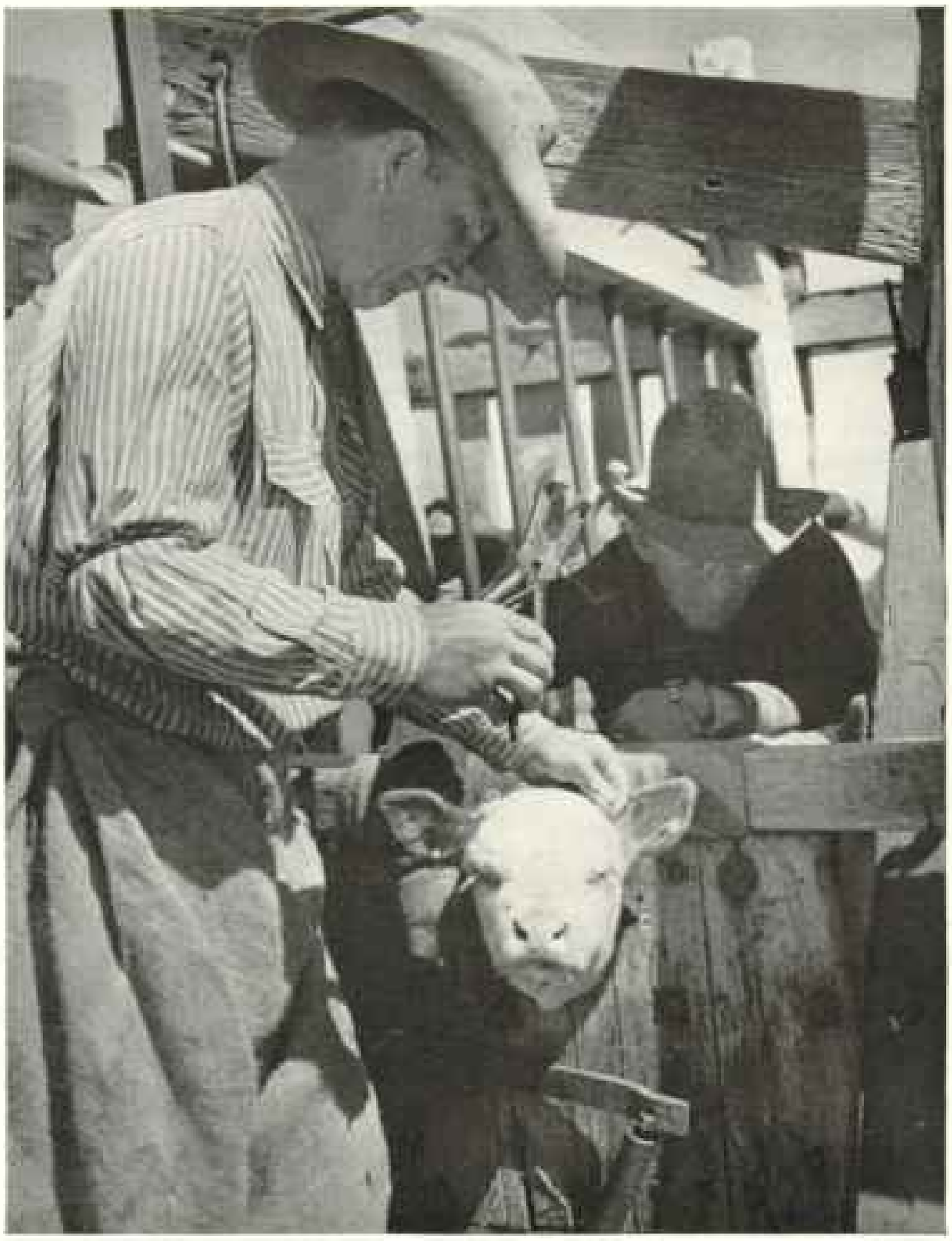
In one Wyoming town they showed me a fine old house, built for his red-skinned wife by a pioneer squaw man.

Though at first the Indian woman ate on the dining room floor, instead of on the table, and preferred a tepee out on the lawn to the bedroom, she slowly learned white women's ways. Hearing about family crests, and not to be outdone, she nailed two tomahawks, crossed like sabers, on her front gatepost!

"I married a Sioux squaw years ago and learned the sign language," said Ed Farlow, of Lander. "I gave lessons in Indian sign talk to Gen. Hugh L. Scott."

Farlow, now 87, has used sign language so

* See "Indians of Our Western Plains," by Matthew W. Stirling, in the National Geographic Magazine, July, 1944.



Staff Photographer B. Anthony Stewart

"Hold Still, Calf! This Won't Hurt You!"

For identification, every cattle owner marks his animals. Most commonly they are branded with red-hot irons, each owner having his own registered pattern. But highbred cattle, such as this white-faced calf on Wyoming Hereford Ranch, are often marked by a tattoo in the ear, done with a hand punch.

long that when he's talking English to you, he unconsciously keeps his hands going, making the corresponding signs.

For years Farlow has provided Indians for Hollywood's use in wild West pictures.

For stage appearances as wolf dancers in the prologue to the movie of Emerson Hough's *Covered Wagon*, Mr. Farlow took 27 Indians to London. I hunted up some of these veterans and in the quest found a few older Indians and one white broncobuster who had toured Europe with Buffalo Bill's "Wild West Show."

In London, Madame Tussaud's waxworks made a big hit with these Indians. So did the underground tubes. "People there all same prairie dogs," said one Indian. "Man go down in one hole, come up another."

Tucked away in the mountain fastness of northwest Wyoming, Jackson Hole is one of America's most sequestered yet spectacular regions (Plate VI). This flat-floored basin of lush grass, lakes, and sparkling streams lies northwest of the Gros Ventre Range and at the very feet of the Tetons.

The Teton Range, whose most scenic portions fall in Grand Teton National Park, is to Wyoming what the Alps are to Europe.

I stood on my head one morning when Mount Moran was mirrored in the still waters of Jackson Lake, and the reflection looked as clear as the right-side-up view of the great peak itself.

Twisting east from Yellowstone Park over U S 20, your tunneled road finally fringes along above the great Shoshone Reservoir.

Below the high dam, set between steep canyon walls, the river passes those nasty-smelling springs which deserve their Indian name of "Stinking Water."

Busiest farm center of Bighorn Basin's Edenlike irrigated region is the hard-working little city of Powell. It unloads cargoes of oil-field and farm machinery and ships out streams of beans, sugar beets, potatoes, vegetables for seed, wool, honey, poultry, and beef cattle.

Into Buffalo Bill's Home Town

Cody, a sprightly city named for Buffalo Bill, is the summer rendezvous for dudes from near-by ranches.

Center of social life here is the Irma Hotel, built by Buffalo Bill and named for his daugh-

ter. Its enormous cherrywood bar, hand-carved and now a lunch counter, was brought from Europe by Bill himself.

On February 26th this town celebrates Buffalo Bill's birthday. To show what they think of him, they even went back to Iowa, picked up the house where he was born, and moved it out here. Here is a Cody Museum, which shows his boots, saddles, spurs, guns, and some of the tomahawks, headdresses, and other Indian mementos of his wild West circus days (Plate V).

Cody is said to have killed 4,280 buffaloes in 18 months to supply meat for railroad construction hands, and took his cowboys, stage robbers, and Indians on tour over America and some of Europe. Without any doubt, Buffalo Bill is more widely discussed than any other man in Wyoming history.

Hours east of Cody, high up on the Bighorn Mountains, Stewart and I halted to look back.

Staff Photographer B. Anthony Stewart

Below-zero Weather Means Never a Shiver for "Buster"

Wyoming fleeces are noted for their weight, usually averaging from 9 to 11 pounds. Wool coats on prize animals, such as this Rambouillet on the King Ranch at Laramie, may run up to 35 pounds. To protect their wool, sheep used for exhibitions often wear overcoats made of canvas.

For empty miles below us rolled the foothills and plateaus and then the rich, peopled lands of Bighorn Basin.

Far, far beyond were the purple mountains of northwest Wyoming. A fleet of giant Army bombers, bound for base at Casper, seemed only a swarm of gnats against the immensity of these spaces.

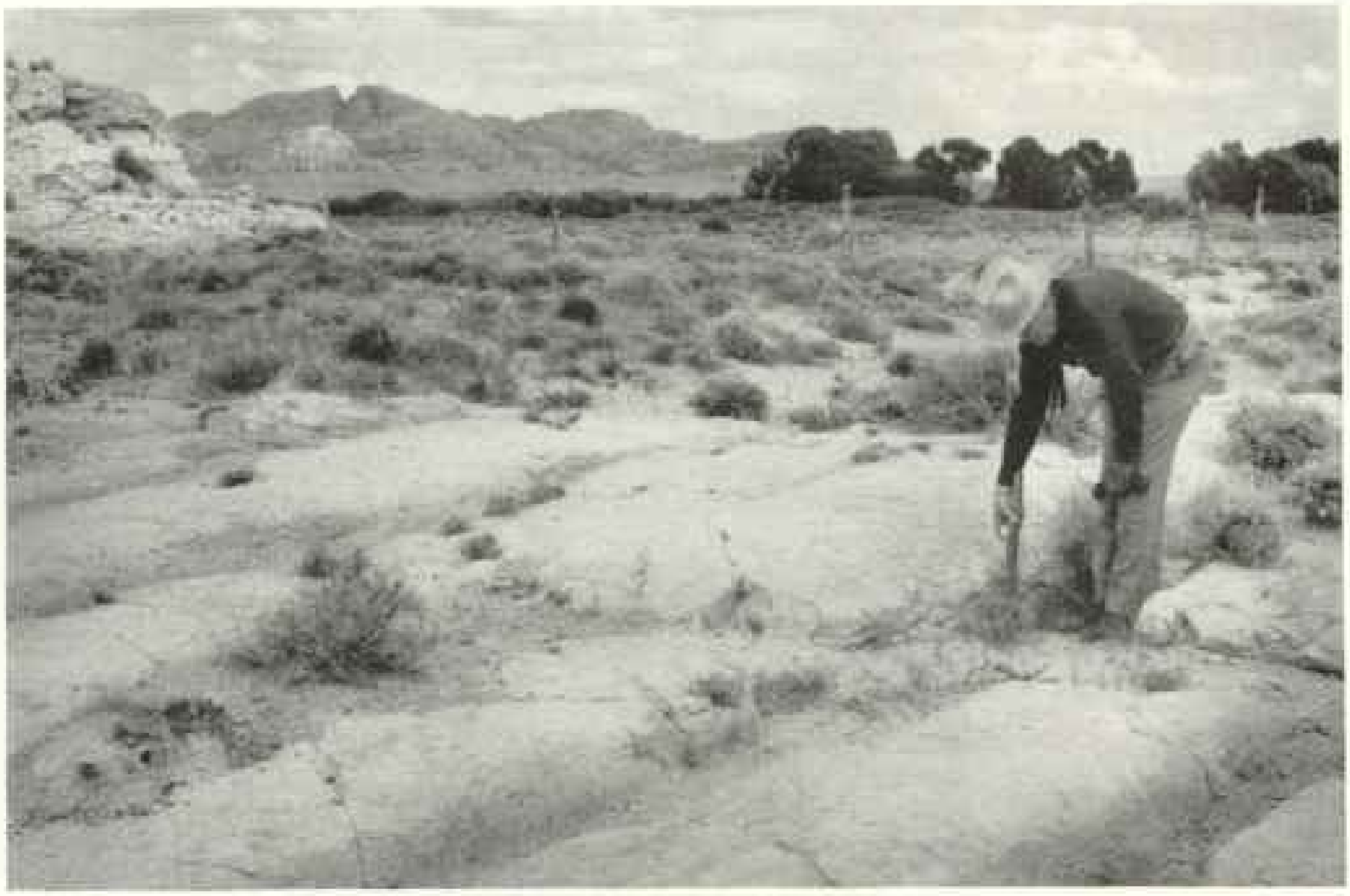
"Too bad I can't photograph *distance*," Stewart grumbled.

All about us, on that vast roof of the world formed by the Bighorn uplift, unfolded one of the rarest regions in all Wyoming. Green mountain meadows fringed with pines; sparkling trout streams; many cattle and sheep up here for the few weeks of summer grazing; elk, too; and—if you could find them—bands of bighorn sheep and dinosaur bone yards.

The Land of the Crow

It was only when we began to descend, on the east side of the range, that once more we came to mountain valley homes and summer camps. This basin east of the mountains, dominated by the busy railroad, manufacturing, and cow town of Sheridan, is a part of historic *Absaroka*, "Land of the Crow," where Indians fought their last great fights against the whites.

By the famous Fort Laramie treaty of 1868, Uncle Sam agreed that Indians should hold



Staff Photographer B. Anthony Stewart

The Man with the Stick Points Out Old Wagon-wheel Ruts on the Oregon Trail

Covered wagons, drawn by oxen or horses, wore the deep ruts in rocky stretches of this pioneer path to the West about 100 years ago. Over this trail and over the Mormon and California Trails, pioneer emigrants swarmed into the wild West. Their graves line the trail. Indians slew many, but still more died of disease or of hunger and thirst. Tens of thousands passed this way (page 185).

all land north of the North Platte and east of the summits of the Bighorn Mountains. Some then named this the "Indian Empire." It was part of the best wild-game country in America, and grass was high, for fattening buffalo. Whites, by treaty, were excluded.

Indians, on their side, agreed to stop robbing and killing white emigrants and settlers in southern Wyoming. Neither side kept these promises: so more soldiers came, built more forts, and fought more fights, till came the Custer Massacre. That was avenged, and by and by there was peace and whites began settling in the Land of the Crow.

But memories of Indian troubles are green.

Visitors flock across into Montana to see the Custer Battlefield and drive out to explore famous old frontier cavalry posts or read historic tablets that mark the battlegrounds.

From plane or train now and then emerges a Sheridan visitor, speaking with a Scotch burr or an English accent, on his way to one of the British-owned ranches hereabouts. They came early to northern Wyoming, these British subjects, some to hunt big game, others to start sheep and cattle ranches. Today they form a marked social element in the State. One, a naturalized American, is a United States Senator from Wyoming.

In speeches to his constituents Senator E. V. Robertson talks with a Welsh accent, in the same Absaroka where at earlier powwows the Indian chiefs addressed the whites in Sioux or Cheyenne. Some of the British and Danes came as Mormon converts. Here, too, are Russians, Swedes, Germans, Italians, Mexicans, and Orientals, who work in sugar beets, logging, mines, oil fields, and railroad gangs.

These all help Wyoming grow. As its rivers run out in all directions, so its human stream flows in from all directions. As it was in the beginning, when buffalo herds blocked the railroad trains, so it is now. Trains stop for herds of sheep and cattle, but they stop so that these animals can get aboard and ride to market. Grass makes Wyoming fat.

Saga of the Carrier *Princeton*

By Capt. William H. Buracker, USN

HIGH LIGHT of a naval officer's career comes when he is skipper of his own fighting ship in time of war. This certainly proved true in my case.*

The captain of the ship is master of every man aboard and every plank and intricate mechanism—the tools to make his ship the best in the fleet.

It was my privilege to command the U. S. aircraft carrier *Princeton*, which was lost on October 24, 1944, in the Battle for Leyte Gulf.

Princeton Fought in Every Major Battle

During her active life of 17 months, the *Princeton* steamed approximately 150,000 sea miles, an average of nearly 300 a day. She took part in every major naval engagement in that period.

Her pilots knocked down 186 Jap planes in aerial combat and destroyed uncounted others on enemy airfields. Her antiaircraft guns accounted for seven more. And in her sweeps from the Gilberts to the Philippines and from the South Pacific to the Ryukyus, at Japan's very doorstep, she sank or crippled 17 ships and inflicted enormous damage to shore installations on many Pacific islands.

Truly our ship, in her short career, made a name for herself that will live long in naval annals.

The *Princeton* began life on the ways as a light cruiser. Early in the war the Navy desperately needed more flattops: so flight decks were added to nine cruiser hulls and the *Independence*-class light carrier was born. *Princeton* was the second of these (page 215).

Our ship, about half the tonnage of a big *Essex*-class carrier, carried only one squadron each of fighters and torpedo bombers. But she had plenty of speed.

Built by the New York Shipbuilding Corporation at Camden, New Jersey, she was christened by Mrs. Harold Dodds, wife of the President of Princeton University, in honor of the Battle of Princeton, January 3, 1777, which followed George Washington's recrossing of the Delaware.

Her first commanding officer was Capt. (now Rear Adm.) George R. Henderson, USN. After commissioning, he took the *Princeton* with her air group to the Caribbean for a shakedown cruise. Most of the pilots and crew were green; only a few had had battle experience.

The shakedown was followed by the trip to the Pacific, where the *Princeton* operated until her loss.

The *Princeton* began her active war career in the assault and occupation of Baker Island, in August and September, 1943. Thus she entered the greatest ocean war in naval history just as our team started its relentless march across the Central Pacific to Japan.

Air resistance in the Baker area was negligible, and our fighter and bomber pilots obtained valuable combat experience at practically no cost.

In all her air strikes and battles against the Japs, *Princeton* operated as a unit in the "Big Show"—our fast task force composed of many carriers supported by new battleships, cruisers, and destroyers.

This phase of our Pacific war was a welcome change from the days I knew before the Battle of Midway. Then only a handful of cruisers and destroyers supported one or two carriers. We depended largely upon surprise to get close. We hit and ran.

Now, in the fall of 1943, the picture was changed. With a strong carrier task force, made up of scores of ships, we felt secure when attacking and relished every opportunity to mix with the Jap Fleet.†

After Baker Island was occupied, the *Princeton* participated in air strikes on Tarawa and Makin, in the Gilberts, in September, 1943. This operation was a softening process, designed to wipe out Jap aircraft and destroy ground facilities, thus paving the way for the landings later.

November found the globe-trotting *Princeton*, after a quick trip back to Pearl Harbor, way out in the South Pacific, making air strikes on Buka, Bonis, and Rabaul, in Admiral Halsey's domain (map, 210-211). These were the first carrier air strikes on the strong Jap

* For his services in command of the U.S.S. *Princeton*, Captain Buracker was awarded: Navy Cross for "extraordinary heroism in operations against the enemy, September and October, 1944 . . . courageous and inspiring leadership . . . When his ship was heavily damaged, he made heroic and determined efforts to save her, with utter disregard for his own safety, even in the face of three great explosions. At all times his conduct was in keeping with the highest traditions of the United States Naval Service"; Legion of Merit for "exceptionally meritorious conduct . . . during operations against Japanese forces in the Western Pacific"; and Purple Heart for injuries sustained when his ship was lost October 24, 1944. In addition, he has received, for his services in the current war, Silver Star Medal, Presidential Unit Citation, and a Letter of Commendation from the Secretary of the Navy.—The Editor.

† See "New Queen of the Seas (Aircraft Carrier)," July, 1942; and "Cruise on an Escort Carrier," by Melville Bell Grosvenor, National Geographic Magazine, November, 1943.

U. S. Navy, Official

A Jap Jill Comes Tumbling Out of the Skies, Knocked Down by AA Fire

Streaming orange flames from a gas tank, the torpedoplane heads for a crash in the sea. It was one of three shot down by *Princeton* gunners off Saipan on June 19, 1944. Intensive 20-mm. and 40-mm. fire, plus black 5-inch bursts from escorting ships, speckles the sky. In such actions ships travel at high speed, twisting and turning to dodge bombs and torpedoes.

position at Rabaul, and our fighters and torpedoplanes ran into their first stiff opposition.

We lost several planes, but the strikes were successful and did much damage to the Japanese. On the return east this same group made the first carrier strike on Nauru.

Gives Air Cover for Marines at Tarawa

Then, still in November, the *Princeton* joined our main carrier force to give air support for the Marines assaulting Tarawa and for the occupation of other Gilbert Islands.

The role of the carriers in the Gilberts was a prelude for many amphibious operations later. First we roamed the seas, knocking out Jap aircraft, shipping, and installations; then we gave the immediate objective a going over. During the approach and landings, our carriers kept the air clear of Jap aircraft and attacked any Jap ship, gun, pillbox, troop concentration, or other target which might impede our forces.

Escort carriers (merchantmen and oilers with flight decks) also played a big part in providing "air" for the landings. One baby flattop, the *Liscome Bay*, was lost at Tarawa.

After our forces were secure in the Gilberts,* the *Princeton* proceeded to the West Coast to correct minor vibrations of her propelling machinery. In a few weeks she returned to Pearl Harbor and there, in January, 1944,

* See "Gilbert Islands in the Wake of Battle," by W. Robert Moore, NATIONAL GEOGRAPHIC MAGAZINE, February, 1945.

U. S. Navy, official

***Princeton* Survivors on a Life Raft Hail a Rescuing Destroyer**

Over 1,400 men were saved from the light carrier when she was lost, October 24, 1944, in the "first round" of the Battle for Leyte Gulf. Some slid down ropes to ships alongside. Others jumped into the water and climbed aboard life rafts or floated in their life belts until picked up—note bobbing heads. Here the destroyer *Irwin* goes alongside the burning ship in the early stages to play hoses and rescue men (page 213).

I reported aboard as understudy to Captain Henderson. I must say that my good friend Henderson gave me a cool reception when he learned that I came aboard to take his ship! He had made the *Princeton* into a fine fighting unit and was justly proud of her.

The *Princeton's* next job was to support our amphibious landings in the Marshalls in January and February, 1944. Our pilots soon neutralized Jap air resistance and then for a month dropped tons of bombs to assist our ground forces. After the reduction of Majuro and Kwajalein our group anchored in the lagoon at Kwajalein Atoll, where we got a good view of the destruction with fires still raging.

At last, on February 8, I relieved Captain Henderson and the ship was really mine. Returning to Eniwetok, we devoted the remainder of the month to supporting our troops until Jap resistance ceased.

When things got slack, I went down to the information center to listen to the radio. It was fascinating to hear the ground forces talking to each other in combat.

A tank commander would shout against the static of gunfire, "Look out for that Jap gun on the right!" Or an aviator would tell a pal what he had hit.

It was like listening to an Army-Navy football game, but much more exciting. The wonderful teamwork among the air, sea, and ground forces was strikingly brought out by these radio conversations.

Off Eniwetok the ship had her first birthday, February 25, 1944. The crew invited me down to their mess for a party. Around a big cake we all sang "Happy birthday, dear *Princeton!*"

Before going into action I often spoke to the crew over the public-address system, telling them about the coming operation. It meant much, especially to the engineers down below who saw and heard nothing of the fighting topside.

Once in a while, when a pilot came back with an exciting story, I had him tell it over the loud-speaker while it was fresh in his mind.

Majuro, a Future Vacation Isle

Following Eniwetok, we proceeded to our new anchorage at Majuro for rest and upkeep. This beautiful large lagoon, surrounded by coconut islets, was taken over without a fight from the Japs. Majuro served as the fleet's main base for the Marianas and Palau campaigns. Someday it may be an attractive stopover for air travelers across the Pacific.

We arranged boat trips to the islands for the officers and men. Under the coconut palms we set up beer stands. All hands enjoyed the swimming and beer parties.

The latter part of March, with Task Force 58, the *Princeton* proceeded to the southwest on our deepest penetration—the first carrier strikes on the Jap islands of Palau, Yap, and Woleai in the Carolines.

Working together, Army and Navy land-based planes searched ahead of the fleet to keep our progress hidden. Although we were deep in Jap territory, they succeeded splendidly, for we were not detected until the late afternoon before our first attack on Palau. Then some Jap torpedo and bomber planes came out, but were disposed of by our fighters and ships' AA batteries. Our strikes at the Carolines continued for three successive days, inflicting severe damage. Our ships suffered no casualties.

We returned to base, first to Majuro and then to Espiritu Santo, in the South Pacific. Again there was a short period for rest, recreation, training, and refitting.

About this time General MacArthur was ready to advance west along the northern coast of New Guinea to Hollandia. We supported his operation with air strikes before, during, and after the landings of American and Australian troops. When we were released, we passed through the central Carolines, striking hard again at the strong Jap bases on Truk and Ponape; then back to Majuro.

Pilots of Air Group 23, the main offensive weapon of the *Princeton*, had now been aboard for well over a year and had flown many combat missions. Under the able leadership of Comdr. H. L. (Hank) Miller, they had rung up an enviable record. The time had come for them to be relieved and sent home for rest. So the *Princeton* returned to Pearl Harbor for replacements and minor repairs.

At dinner in the wardroom we feted our veteran pilots, wishing them Godspeed and happy landings. Princetonians of Hawaii, including Governor Ingram M. Stainback, came aboard to dine the night we welcomed our new pilots.

Air Group 27 under command of Lt. Comdr. E. W. Wood, Jr., USN, had been formed for some time and was well trained. Pilots were enthusiastic and impatient to get at the Japs, even though few had been battle trained.

We left Pearl Harbor on May 29 and rejoined our task force at Majuro, where we received new orders. Our mission was to capture the Marianas.

As we steamed the endless Pacific miles toward Saipan, I was anxious about the pilots of our new air group. Without any preliminaries they were going right into the "Big Leagues."

Princeton Helps Take Saipan

Before dawn on June 11 we got our fighters away and struck Saipan.* So well had our advance been hidden we caught the Japs completely by surprise.

In furious air battles, fighters of the fleet soon eliminated practically the entire Japanese air force in the islands, accounting for 150 planes destroyed and damaged the first day.

From my station on the bridge I watched every plane take off and followed the pilots by radio. I yearned to go along to see the show, but my job was on the bridge. After all, these boys had to have a home to come back to.

Like the 1,500 engineers, seamen, plane handlers, and the rest of the crew, those of us topside could see nothing of the battle for Saipan except when planes ventured our way. Our carrier group cruised around some 75 to 150 miles offshore. As usual, we depended upon the reports of the returning pilots and the radio for news of the battle.

Landing on board, the pilots would go below to the ready room for coffee and briefing for the next mission. A few made three flights. Our plane handlers never worked faster.

I was particularly relieved that first day when I counted noses and found that we

* See "South from Saipan," by W. Robert Moore, National Geographic Magazine, April, 1945.

 Kodachrome, U. S. Navy, Official

In the Groove! An Avenger Makes an Approach for a Landing

To slow his torpedoplane, the pilot "puts on the brakes" by lowering his flaps and wheels. His tail hook is down, ready to engage one of the arresting wires strung across the deck. When the carrier nears the battle zone, guns will be uncovered and crew will don helmets.

Kodachrome, U. S. Navy, Official

The Carrier's Flight Deck Is Fouled (Blocked) by Another Plane; So This Hellcat Roars Past after Taking a Wave-off

The pilot will cruise around the ship until the landing signal officer directs him to come in. The LSO's station is on the projecting platform behind the dark screen, background (Plates VIII, XVI). Handlers, fire fighters, and gunners man the gun gallery. New-type life nets hang from the rail, beside a life raft.

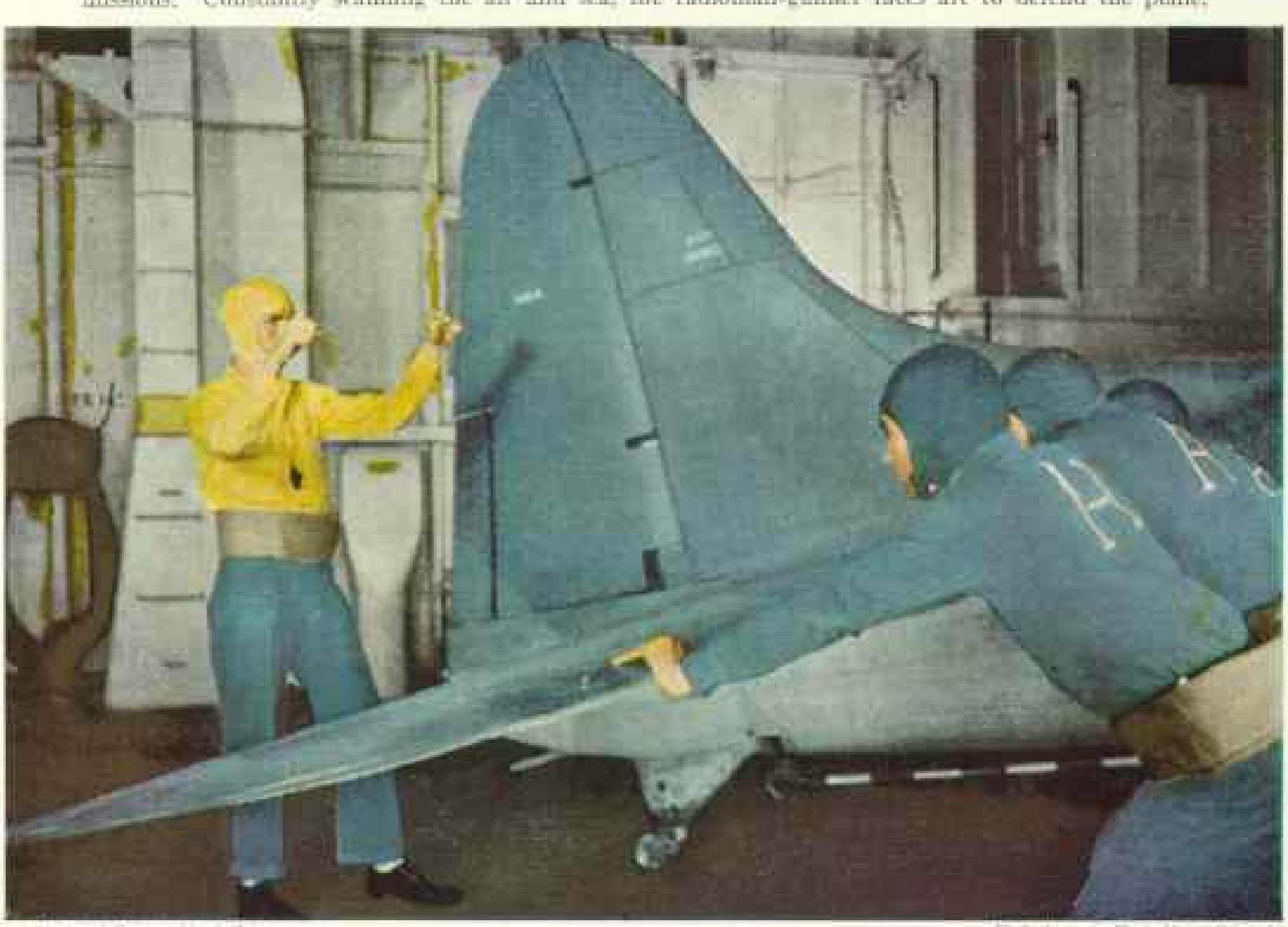
 Kodachrome, U. S. Navy, Official

Rolling up to the Take-off Position, a Hellcat Spreads Its Fighting Wings

Handling crews swiftly pull the wings around and lock them in place. After spotting (placing) for warm-up and take-off, the fighter will thunder up the deck into the air. Suspended under the plane is a belly tank for extra gas. It will be brought back unless the pilot drops it to lighten ship in combat.

Ordnanceman Checks Twin 30s of a Scout Plane on the Hangar Deck

Navy scouts search for the enemy ahead and on the flanks of the task force and serve as dive bombers on combat missions. Constantly scanning the air and sea, the radioman-gunner faces aft to defend the plane.



Kodachrome, U. S. Navy, Official

Hangarmen Spot a Plane Just Lowered by Elevator from the Flight Deck

Efficiency of a carrier largely depends upon the speed and skill of its plane handlers. The bomb which destroyed the *Princeton* set fire to planes being gassed and rearmed in her hangar.

 Kodachrome, U. S. Navy, Official

Another Deadly Gift for Tojo—a Torpedo Is Loaded Aboard an Avenger

"Run straight and true—no porpoising!" the chief torpedoman bids his treasured "fish." Torpedoes require constant oiling and adjusting of delicate mechanisms. Men form the same affection for their charges that a cavalryman does for his horse. Wheeled under the Avenger, the torpedo will be hoisted into its belly.

Kodachrome, U. S. Navy, official

From Busy Fly Control, the Air Officer Directs the Flight Operations of a New Escort Carrier

Red flag indicates the deck is not ready. On the stern the landing signal officer has hoisted another red flag and waves off circling planes. Signalman at right flashes a message to an airborne pilot; lookout at left searches for approaching planes; the "talker" relays messages to flight deck, hangar, and pilots' ready room.

Kodachrome, U. S. Navy, Official

Closely Spotted on Deck Aft, Hellcats and Avengers Warm Up Prior to Take-off

Flight operations from a carrier are complicated because pilots cannot land and take off at the same time. During launching, planes are placed aft. Before landing others, they must be flown off, moved forward, or stowed below in the hangar. Men standing by wheel chocks must be alert to whirling propellers overhead.

 Kodachrome by John R. Whiting, courtesy Flying

For Night Landings, the Signal Officer Wears a Weird Fluorescent Suit

Standing in the dark like a wraith, he tells the incoming pilot with his outstretched, painted paddles, "You're in the groove—come on in." The canvas windbreak is pulled down if a plane approaches erratically. Then the LSO can jump back to safety in a net below. His platform projects far out from the port aftercorner of the flight deck, where he has a clear view of approaching planes (Plate XVI). This remarkable photograph was taken on board U.S.S. *Bennington*, Capt. James B. Sykes, USN, commanding.

Using Fog Sprays and Extinguishers, Red-clad Fire Fighters Can Snuff Out Infernos

Behind curtains of water from the nozzles, they advance close to gas flames, smothering them with fine mist. Because flattops carry vast stores of gas and bombs, they are elaborately equipped for fire fighting.

Kodachrome, U. S. Navy, Official

Just Before the Take-off, Dive Bomber Pilot Makes Final Check with His Mechanic

Kodachrome, U. S. Navy, Official

Welcome Sight to the Homing Pilot, an Essex-type Flattop Cruises "Alone on a Wide, Wide Sea"

Observed from the air, the big mother ship seems tiny and narrow; yet, as the pilot approaches, she looms ever larger, her 880-foot-long flight deck offering ample room for landing. Here a plane taxies forward for spotting, while another flying abreast of the bridge has received a wave-off and is coming around for another approach.

© National Geographic Society

A Gunner Loads a Clip into Twin-mount 40-mms

Here he wears a kapok life jacket, tin hat, and flash gear to protect him from powder burns. Carriers put up a terrific antiaircraft screen when enemy planes break through their fighter protection. In the war zone gunners stick by their guns in foul weather or fair. Often they sleep and eat there.

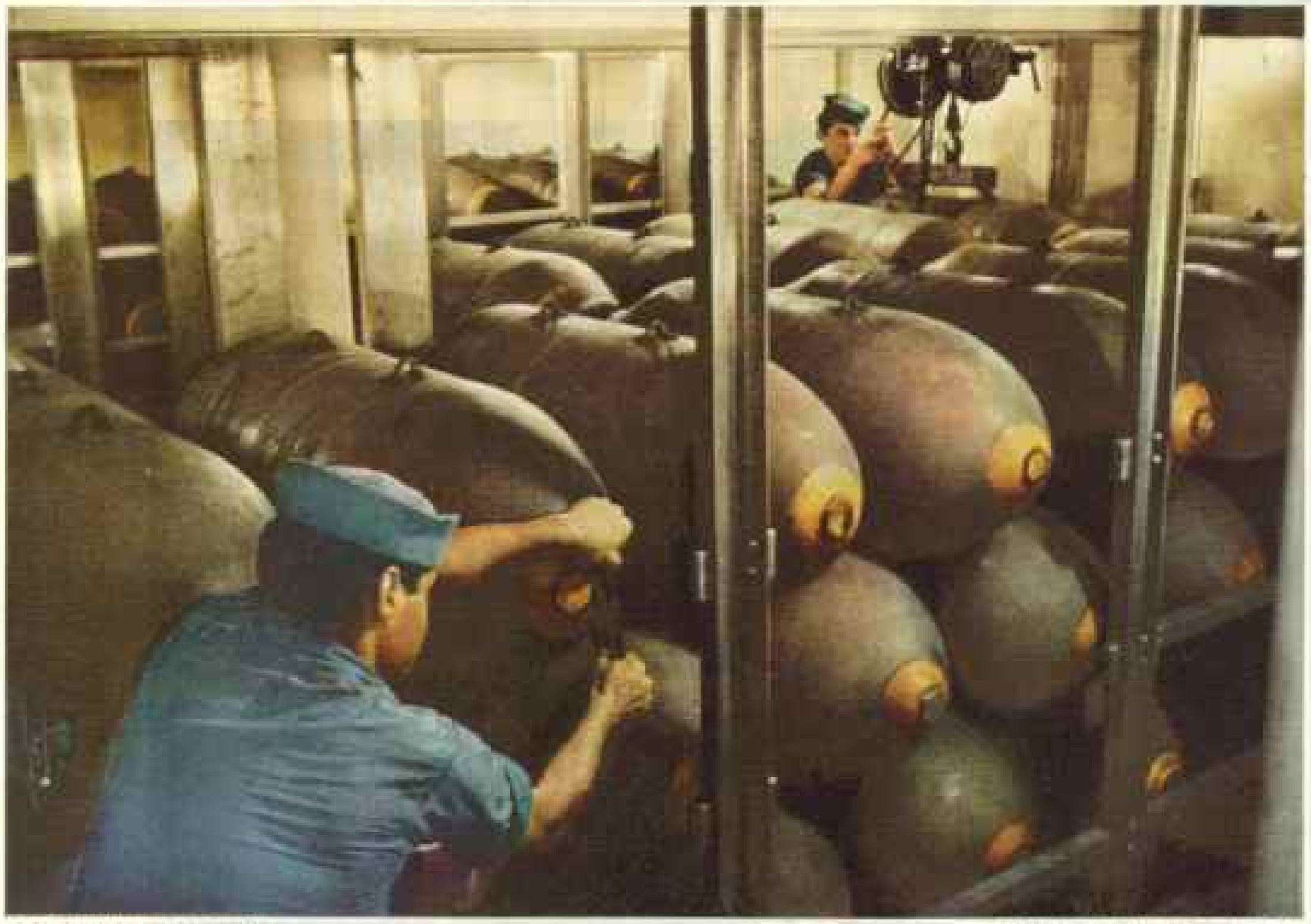
Kodachromes, U. S. Navy, Official

By Their Headsets the Pilot Knows Them

The Vanderwall twins, Arnold (pointing) and Andrew, frequently fly together as radioman and gunner in an Avenger. Ready for take-off, they wear yellow life belts, radio helmets, ammunition belts, revolvers on left breasts, and bowie knives on coveralls. Their home is Grand Rapids, Michigan.

"Let's Speed Up Our Next Deck Spot," the Flight Deck Officer Tells a Handler

Carriers constantly strive to speed up servicing and rearming planes. In enemy waters, the longer planes remain on board the greater the danger that an unlucky bomb hit may cause fatal fires.



 Kodachromes, U. S. Navy, Official

Deep in the Bowels of the Ship Bombs Are Stowed in Bins

At the touch of a button in emergencies, sprinklers operate and the magazine can be flooded. Ordnanceman in background is lifting a 1,000-pounder by chain hoist, suspended from an overhead track. He will send it topside for fusing and loading into the bomb bay of a dive bomber or torpedoplane.

© National Geographic Society Kinkaid, U. S. Navy, Official

Carriermen Are Always Drilling—Here They Practice Chocking Planes

Gathered around a towing tractor, they listen to an officer instructing how to chock and unchock plane wheels with split-second precision and safety. The wooden wedges lock the wheels in deck position. Much spare time on carriers is devoted to such drills.

Kodachrome, U. S. Navy, Official

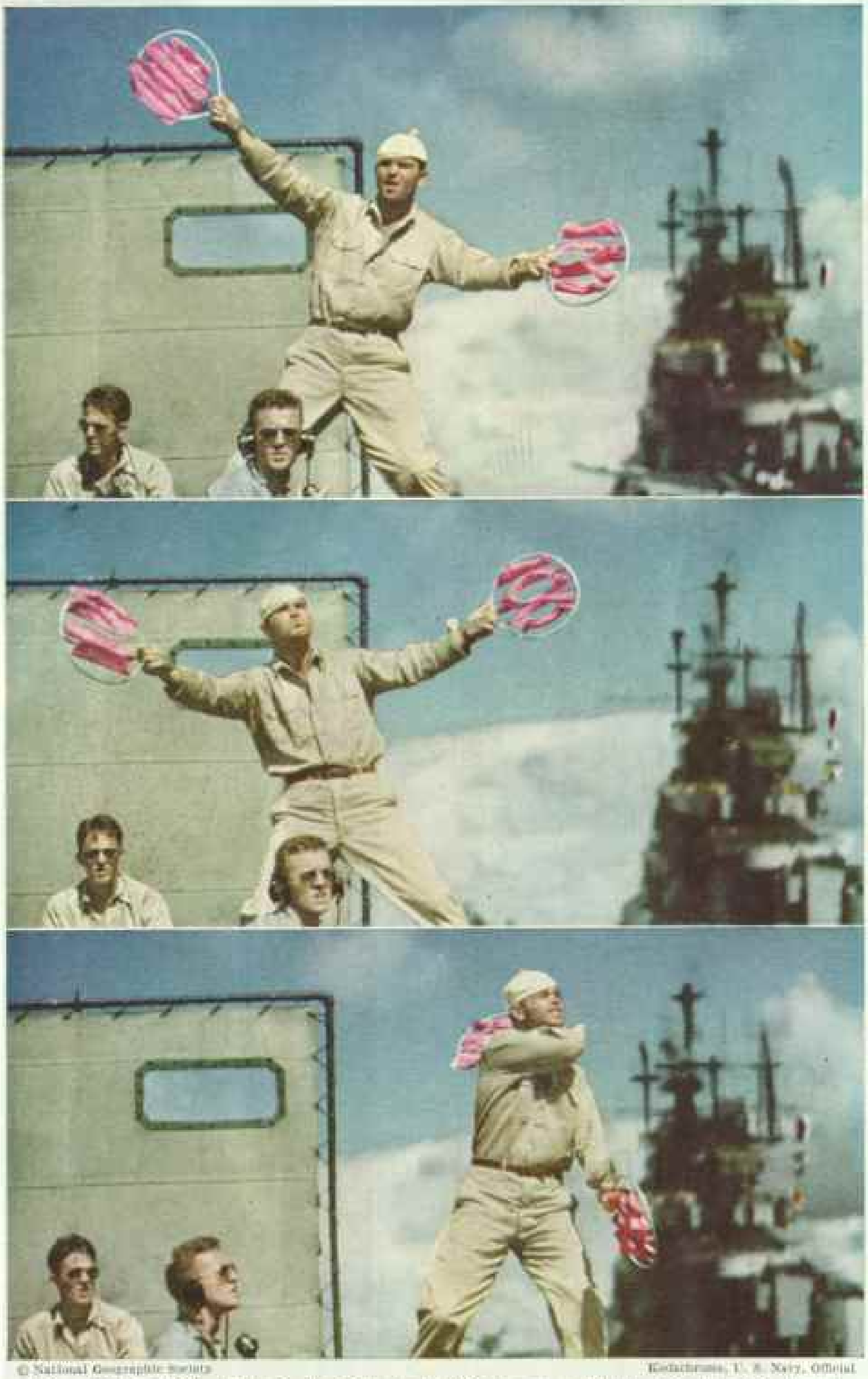
Off the Starboard Quarter, a Destroyer Stands Ready to Pick Up a "Dunked" Pilot

A part of the carrier is her plane-guarding destroyer. If a pilot runs out of gas, bounces over the side from a bad landing, lands in the water because his wheels are shot up, or is too heavily loaded to take off and is forced down ahead of the carrier, he knows a "can" is there to throw him a line.

Kodachrome, U. S. Navy, Official

In a Rough Sea, a Destroyer Escort Comes Alongside to Pass Mail or Passengers to a Carrier

Sometimes the little ships send over surgical cases in a breeches buoy, for DEs do not usually carry doctors. Destroyer escorts were born of the war to fight submarines. Now they serve as plane guards and screening vessels for the slower escort carriers and convoys.



 Kodachrome, U. S. Navy, Official

"One Wing High—Get in the Groove!" "Come on a Little—You're OK!" and "Cut Engine!" Signals the Landing Officer (Top to Bottom)

From his platform the LSO watches an approaching pilot's every move and guides him in safely.

had not lost a pilot from the *Princeton*.

Air strikes continued for several days against Saipan and Tinian. So completely did we master the air that our battleships and cruisers were able to go in close and bombard with heavy shells strong points on the beaches with little opposition from the air.

On D Day, June 15th, the 2d and 4th Marine Divisions landed on Saipan. Our returning pilots reported that the Marines were getting a hot reception from the ground forces and they were glad they did not have to fight their way ashore in LVTs.

Though we had largely eliminated Jap air power, we still were bothered by some shore-based planes attempting to torpedo us. I remember particularly the torpedo action the night of D Day.

Carrier fighters took care of most of the attacking planes during the day, but at dusk, and later, a few got in and made runs on our ship.

It was a superb spectacle, a hundred Fourth of Julys rolled into one. All around us scores of ships seemed on fire as their guns put up an AA screen. Weaving tracers, flares, and bursting shells spangled the skies. Once I saw six flaming Jap planes falling like meteors around us.

Black Bats—Jap Torpedoplanes

During the action the *Princeton* was steaming at high speed, twisting and maneuvering to make a slippery target. We had to be on our toes to prevent collisions with other ships and to avoid firing on them by mistake.

Every once in a while dark shadows whizzed by like big black bats. These were enemy planes which probably had launched their torpedoes. Though "tin fish" must have been in the water around us, none hit our ship.

In addition to their aircraft attacks, the Japs attempted to throw us out of the Marianas with their own strong carrier force.

On the 19th and 20th of June the *Princeton* took part in one of the critical naval air actions of this war, the Battle of the Philippine Sea.

The morning of the first day large numbers of Jap carrier planes came in from the west, but Vice Adm. Marc A. Mitscher, our task force commander, was all set and had fighters out to meet them. In the resulting air battles the cream of the Jap naval air forces was destroyed and our landings in the Marianas assured.

Our *Princeton* fighters did a particularly good job. They knocked down 28 planes. We lost two, including our young air group commander. Lieutenant Commander Wood was one of the few pilots on board who had had previous combat experience. He inspired every pilot and commanded the respect of all. Moreover, he was an accomplished pianist and was always the center of a jolly group around the wardroom piano. His loss was sorely felt.

Some Jap planes got through our fighters, but the ship's AA fire took care of those that came near the *Princeton* (page 190). Again luck was with us. None of the ships of our task group got hurt.

We chased the Jap Fleet until the night of the 20th while it fled with its remaining ships, mostly cripples, northwest toward home.

Searchlights Save Pilots in Darkness

Since the fighting was at extreme range, our planes returned long after dark with precious little fuel. To aid pilots in spotting their carriers and "getting down" quickly, security rules were broken and ships' searchlights turned on.

Though we were lighted up like Christmas trees and could be seen for miles, no Jap attacks developed. But many pilots were saved a dunking, guided by the friendly beams to "landing fields" floating in the Philippine Sea. Many others, forced down "in the drink" out of gas, were picked up by our destroyers.

Next, the *Princeton* gave air support for the occupation of Guam and Tinian, which followed Saipan. We spent most of July dropping bombs on them and Rota near by.

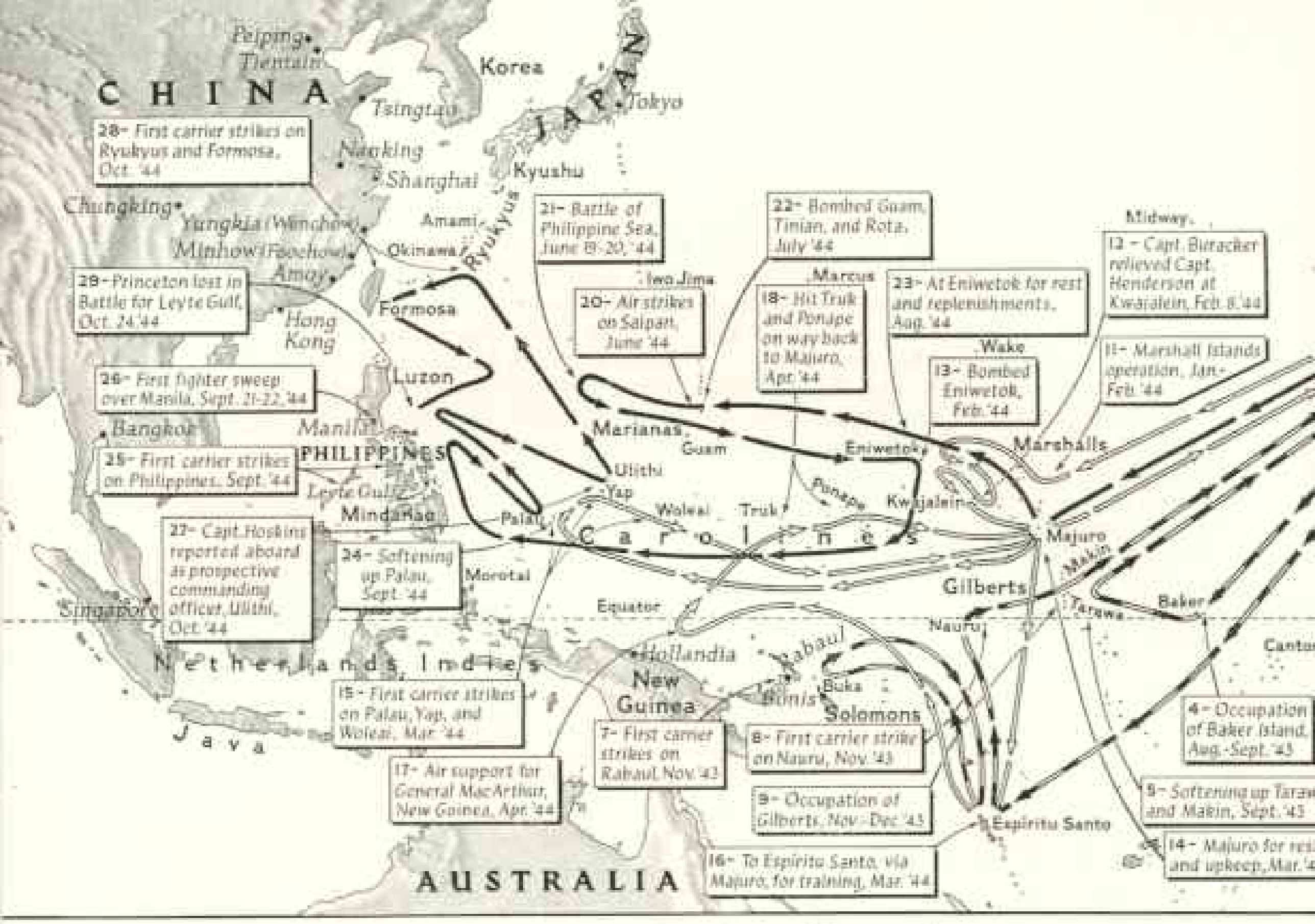
Following the Marianas campaign, we returned to Eniwetok to prepare for the next play in our westward march. At this time, August, 1944, Adm. Raymond B. Spruance was relieved by Adm. William F. Halsey, Jr., and from then on we operated as a unit of his 3d Fleet.

Toward the end of August we sailed for Palau. Again we softened up Jap troops and installations prior to occupation by our ground forces.

We steamed west and on September 9 initiated the first carrier air strikes on the Philippines.* We started with Mindanao and proceeded up the chain of islands through the Visayas (central Philippines) and on to Luzon and Manila. These attacks stopped the flow of Jap planes to Palau, and also to Morotai, where troops under General MacArthur landed simultaneously with ours on Peleliu in the Palaus.

Then the *Princeton* backtracked to the Palaus to give air support for the actual landings there.

* See "Mindanao, on the Road to Tokyo," November, 1944, and "What Luzon Means to Uncle Sam," both by Frederick Simpich, NATIONAL GEOGRAPHIC MAGAZINE, March, 1945.



On September 21 and 22 we were again off the Philippines. Our pilots made the first fighter sweep over Manila and did an excellent job. They knocked down 38 enemy planes with the loss of only one, but its pilot, Lt. W. E. Lamb, USN, was not missing for long.

On one of these strikes, Lieutenant Lamb, the executive officer of our fighter squadron, made a forced landing in Lake Taal, 35 miles south of Manila, after Jap AA fire had damaged his engine. Later this resourceful pilot showed up at Pearl Harbor and gave an interesting account of his visit with friendly guerrillas on Jap-held Luzon and his rescue by an American submarine.

Early in October we proceeded to Ulithi Atoll, recently wrested from the Japs and now used as an advance fleet base. A typhoon was raging in the vicinity, and so we put to sea for two days to ride it out.

Western Pacific typhoons are no fun. Sometimes they develop with little warning, but this time our weatherman gave advance information which enabled our task-force commander to maneuver his ships clear of the path of the storm. However, even along its edge we experienced high winds and rough seas, with green water breaking over even the largest ships.

Destroyers looked like submarines, and from previous service in them I knew that life aboard was none too comfortable. On the *Princeton* the planes had to be secured with additional lines, and activities on the tossing, slippery, wind-swept flight deck were limited to essentials.

At Ulithi Capt. John M. Hoskins, USN, reported aboard the *Princeton* as prospective commanding officer. Though I was glad to welcome him as a friend, I certainly did not appreciate his coming aboard to take my ship. Hoskins was to ride with me during the next operation as a passenger.

On October 10 our task force struck deep into the heart of the Japanese homeland when we hit the Ryukyus for the first time.*

We were getting closer and closer to the core of the rotten apple.

These strikes were followed, on the 12th to 14th inclusive, by the first carrier attacks on Formosa.† Now we were near the coast of China itself. We went in so close that we could see Formosa from the *Princeton*.

We always approached targets warily, trying to get our flights off prior to Jap attacks. A few "snoopers" usually showed up, but before real opposition developed our flights were launched and well on their way.

We received considerable attention from the enemy off Formosa in the late afternoon of the third day. Just before dark, torpedo-

* See "Peacetime Rambles in the Ryukyus," by William Leonard Schwartz, NATIONAL GEOGRAPHIC MAGAZINE, May, 1945.

† See "I Lived on Formosa," by Joseph W. Ballantine, NATIONAL GEOGRAPHIC MAGAZINE, January, 1945.

Drawn by Herbert R. Raymond and Irvin R. Altman

Like Hen Tracks the *Princeton's* Cruises Crisscrossed the Pacific

Graphically shown here are the missions of this light carrier as she traveled 150,000 sea miles in 17 months (page 189). Including time in port for rest and repairs, she averaged nearly 300 miles a day. This fast cruising is typical of all our ships in the "Big Show" as they drive westward towards Japan. For clarity the cruises are divided into three groups, denoted by different arrows; box numbers indicate the order of events in the *Princeton's* life, from commissioning at Philadelphia to her loss in the Philippine Sea.

planes and bombers came in from all directions on our task group in well-coordinated and determined attacks. Torpedoes were dropped close aboard, but with the good work of the AA batteries, plus rather violent maneuvering of ships, none got home. The *Princeton* launched additional fighters, which intercepted 16 twin-engine bombers, knocked down 13, and damaged the other three. None of our planes were lost.

After the Formosa strikes, we proceeded to the eastward to replenish our fuel from our efficient tanker fleet, which with escort carriers had ventured farther into enemy waters than ever before. There we stood by, ready to return to the firing line should our services be required. Other task groups gave air support to General MacArthur and Vice Adm. Thomas C. Kinkaid at Leyte.

History Made in Battle for Leyte Gulf

As we know, the Japs threw everything they could against us to dislodge our troops from Leyte. When information showed that the entire remaining Jap Fleet was approaching, all our carrier task groups were alerted.

On October 24 the great sea Battle for Leyte Gulf began. Our 7th and 3d Fleets took on successfully everything the Japs had to offer. This battle will go down as one of the most decisive victories in history.

Dawn on the 24th found our carrier task group within easy air range, east of Manila. *Princeton's* main job was to send a fighter sweep over the capital. Then we were to stand by with an attack group of fully gassed and loaded torpedoplanes, with fighter escort, for a strike at important Jap naval units, or shipping in Manila Bay.

As was usual when we expected strong Jap opposition, our fire hoses were run out in the hangar and on the flight deck, and the crew fed at battle stations.

Things were calm and peaceful until about 7:50, when a large group of enemy aircraft was reported approaching from the direction of Manila, with a second group about 15 miles behind. There were between 75 to 100 Jap planes.

On the *Princeton* we "scrambled" our remaining Hellcats, and these, with fighters from other carriers, lost no time in closing the Japs. I can't speak too highly of their superb work that morning. They completely disorganized the Japs and shot down most of their planes.

Later, when the story could be pieced together, we discovered that *Princeton* pilots shot down 36 planes while losing but one.

Princeton Hit in Her Achilles Heel

Suddenly, at 9:38, a *Princeton* lookout detected a single Jap plane making a shallow dive on our ship from sharp on the port bow. Because of the low clouds, we had only this brief warning. Our guns, and those of other ships in company, took the Jap under fire. I started to maneuver, but there was not sufficient time (page 214).

The Jap dropped his 500-pounder from under 1,200 feet. It hit the *Princeton* forward of the after elevator and slightly to port of the center line of the ship. The plane passed on aft and was brought down by fighters, but too late to do us any good.

U. S. Navy, Official

Portrait of the Globe-trotting *Princeton* Headed for the Pacific

Her planes are closely spotted on deck ready for take-off, but "sight-seers"—off-watch crewmen—wandering about the flight deck indicate it will not be soon. When the reserve bomb stowage below the Avengers (with spread wings) exploded, the blast blew out the ship's stern. Forty-mm. and 20-mm. guns pack the galleries at the sides. Overhanging stacks badly damaged the destroyer *Morrison* when she tied up alongside to fight fires.

From where I stood on the bridge, the hole in the flight deck appeared so small it seemed hardly possible that major damage had been done. I visualized slapping on a patch in a hurry and resuming operations. I must admit it hurt to see my ship injured by a Jap bomb. It was as if I had been wounded myself.

But the Jap bomb had hit the *Princeton* in her Achilles heel. It put out of action the after fire-fighting system, and it also passed right through the gas tank of a torpedoplane in the hangar, spreading the fire instantly to others. It exploded between the hangar and the deck below. Flames shot down engineering spaces aft, and back into the hangar.

Smoke was intense from the start, not only in the hangar but throughout the ship below decks except in spaces forward. Very soon it was billowing up from the sides of the ship, flowing aft, and making the stern untenable for personnel there. Heat and smoke forced these men to jump overboard. Circling destroyers picked them up.

At the time of the hit we were making 24 knots. I asked the chief engineer if he wanted to slow, but he said it was not necessary. The engineering plant was all right, except that conditions were fast becoming bad for personnel.

Very soon gas tanks of other planes began exploding, freeing more gasoline. Ammunition in the guns, plus a reserve stored in the hangar, started popping. All this added to the inferno.

I slowed to 18 knots and began getting personnel out of the lower spaces before they were overcome by heat and smoke.

As the wounded *Princeton* was retarding his task group, Rear Adm. F. C. Sherman soon left us to conduct air strikes, but detached the cruiser *Reno* and three destroyers to assist us.

Explosions Blow Out Elevators

Our first major explosions occurred at 10:02. Torpedoes in the burning planes let go with a mighty roar. The first blew out the after elevator. Shortly after, another mighty blast buckled the flight deck, leaving holes in it.

From my control station in the "island" (bridge tower) I could see the smoke and raging fire down in the hangar. Soon the forward elevator was blown out, and hot smoke pouring up into the island drove us to the flight deck.

These terrible explosions were always accompanied by flying fragments, which caused many casualties. There were some even on the bridge.

Before leaving my control station I told the chief engineer to secure below and passed the word over the announcing system, "All hands topside!" I had turned the ship 60° to the right of the wind, which was blowing about 17 knots. The smoke and fire then drew aft on the starboard side, leaving the port catwalks at the edge of the flight deck clear of smoke. Gradually we slowed until we were dead in the water.

When I met the executive officer, Comdr. Joseph N. Murphy, on the flight deck, I asked him to get the men off who were not needed to fight fire, control damage, or man the guns.

Seeing our heavy explosions, Admiral Sherman dispatched the cruiser *Birmingham* and another destroyer to our assistance. From then on we had two cruisers and four destroyers to render aid.

Destroyer *Irwin* Rescues Hundreds

About 10:10 the *Irwin* came alongside to port, the windward side (page 191). We lowered the seriously wounded directly to her forecastle. Many men abandoned ship by lines dangling from the *Princeton*. Others jumped, then swam to the *Irwin* or to life rafts thrown in the water. A few caught between the two hulls even swam under the destroyer and were hauled out on her other side.

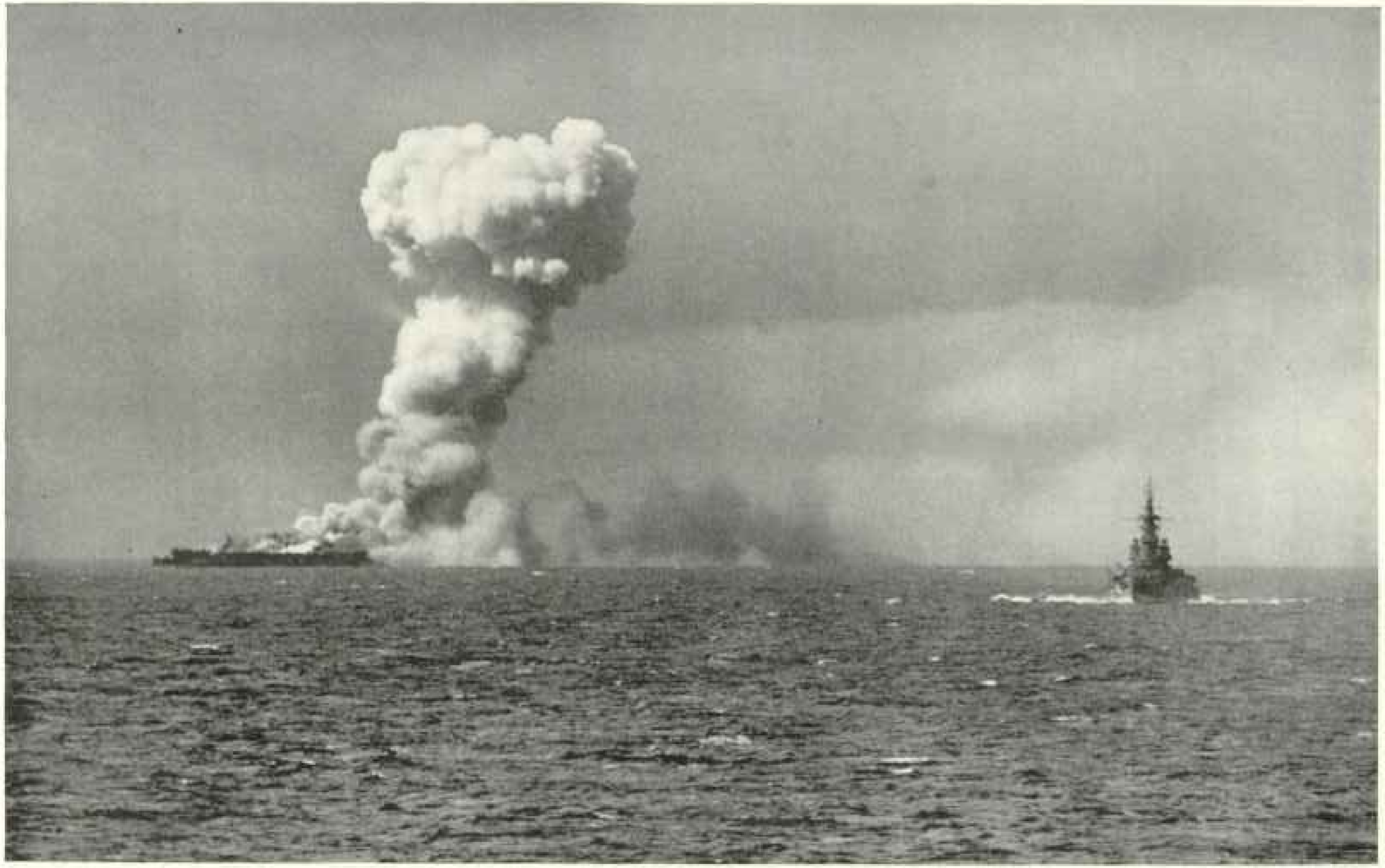
The *Irwin* did a grand job playing fire hoses into the forward part of our hangar and in recovering personnel. She took on between 600 and 700 of our survivors. Men were packed on her decks like sardines.

Soon we lost fire-main pressure forward. Then the *Princeton* had only her emergency equipment left.

Jap planes were still prowling near us. The *Reno* shot down two. But during the eight hours we fought to save the *Princeton*, though we were only 125 miles from Manila, we suffered no direct attack.

At 10:55 the *Birmingham* came alongside to port forward, the *Irwin* making way, to give us additional fire hoses (page 215). Shortly the *Reno*, too, came alongside, but she could not remain because of the dense smoke and heat. The *Birmingham* gradually shifted aft as we forced the fire back. Her hoses were led over to the *Princeton* and manned by our fire fighters. In addition, she sent volunteers to assist.

The destroyer *Morrison* secured to our leeward, or starboard, side and passed us two hoses. The seas and wind caused much motion between the ships. Rolling against the *Princeton*, the *Morrison* suffered severe damage when her superstructure struck the stacks and overhang of our flight deck. But she hung on doggedly and gave splendid help. Later, off Okinawa, this heroic ship was lost in a suicide bomber attack.



U. S. Navy, Official

From the Low Clouds a Jap Bomber Struck the *Princeton*, and Her Torpedoplanes Exploded in This Mighty Blast

A column of smoke like a volcano's plume quickly followed. Big chunks of flight deck and other debris hurtled through the air. Men on the stern of the ship were isolated. Many jumped overboard and were picked up by the circling ships. This *Independence*-class carrier was finally sunk by the cruiser *Reno* in the opening phase of the Battle for Leyte Gulf, formerly called Second Battle of the Philippine Sea (page 218). *South Dakota*-class battleship, right.

U. S. Navy, 60[6]43

Squirting Water from Her Forecastle, *Birmingham* Comes Alongside *Princeton* to Fight Fires and Help Rescue Crew

The carrier was struck by a single bomb shortly before this. Torpedoplanes in her hangar are burning fiercely. Fighters are still spotted forward on the flight deck, since the *Princeton* was landing planes for fueling and rearming when the Jap dive bomber struck. Similarity of the two hulls is clearly shown here, a flight deck on the carrier replacing the 6-inch guns and bridge structure of the light cruiser (page 189).

U. S. Navy Official

Constantly Banging Against Her Side, a Destroyer Plays Hoses into the Burning *Princeton*

Aided by accompanying cruisers and destroyers, the carrier had almost put out the fires when Jap planes approached and fire-fighting vessels pulled off. The crippled ship could not finish the job alone; the fires soon flared up again. As the cruiser *Birmingham* approached a second time, the *Princeton* blew up, causing many casualties on both ships. Damage to the gun galleries and flight deck was caused by the ships' rolling together.

We made excellent progress in reducing the fires and about 1:00 p.m. had them contained in the extreme after section of the hangar. We thought then that we definitely had the fires licked and that they would be out in some 20 to 30 minutes.

As far as we knew, the *Princeton's* hull was still intact. Our hopes were high for bringing the ship home, even under her own power.

Fires Nearly Out—Jap Planes Appear

When conditions appeared most favorable, Jap aircraft were picked up in the vicinity and a submarine was reported near by. Immediately the *Birmingham* and *Morrison*, about 1:30, pulled clear so that they could maneuver and better protect our ships.

In my opinion this turn of fate caused the loss of the *Princeton*. Fire fighting stopped when success seemed so near.

The enemy scare did not last long. One Jap plane was seen, but it did not attack.

During the interlude our fires built up again, and it was soon realized that more fire-fighting equipment was needed. The *Birmingham* was requested to come back to finish the job and then take us in tow.

This all took time. The seas had come up and the wind had increased. The cruiser had difficulty coming alongside the helpless *Princeton*.

Our air officer, Comdr. Bruce L. Harwood, with a party of officers and men, was sent aft in the hangar to take lines and hoses from the *Birmingham*. Harwood had been outstanding all day for his leadership in directing fire parties and his constant disregard of personal danger.

Throughout the day I had been concerned about a reserve bomb and torpedo stowage

U. S. Navy, official

Reunion of *Princeton* Men on the *Essex* after Their Carrier Was Lost

Third from the left, squatting, is the author, Capt. William H. Buracker, USN, captain of the *Princeton*, and to the right, Comdr. Joseph N. Murphy, USN, executive officer. Lt. Comdr. Frederic A. Bardshar, commander of the air group, next to Murphy, and Ensigns Arthur H. Munson (second from left), Robert M. Burnell, and Frank P. Kleffner (right) were in the air when their ship, the "Peerless P." was struck. They landed on other carriers after knocking down many Jap planes.

in the after part of the ship. We had been unable to jettison this ammunition because of the intense heat. Fires had been raging around it for some five hours; yet there had been no major explosions since morning.

Despite this ever-present danger, the one thought in every man's mind on each loyal assisting ship and on the *Princeton* was to save our carrier.

Mighty Blast Blows Out Stern

At 3:23 in the afternoon, while the *Birmingham* was still approaching our port side, came the most terrific explosion of the day. The reserve bomb and torpedo stowage let go in a volcanic eruption.

Coming after a long lull, the explosion was terrifying. The after part of the ship above decks was blown high and fell in the water astern. Flying fragments, some huge, some small, burst outwards and upwards.

Big chunks swept the *Birmingham*, causing many casualties in killed and wounded. The *Birmingham* suffered 229 dead and 420 injured, far more than the total casualties on the *Princeton*.

Our ship also was showered with flying debris from stem to stern. Practically all left aboard were killed or injured. Commander Harwood and his gallant party aft in the hangar all were lost.

Captain Hoskins, the prospective commanding officer, was standing with me amidships on the port side. When the blast came, we all started crawling and running forward for protection. Someone noticed that Captain Hoskins couldn't move. Going back, I saw that his right foot was hanging by a shred. He had already applied a tourniquet to his leg, stopping the flow of blood.

U. S. Navy, official

Sailors Dive Over to Help *Princeton* Men not Quite Able to Make It

One man is diving in, while another has just made a big splash. The survivor in the water at the right has abandoned his life buoy, but he was too weak to reach the overcrowded whaleboat.

In the lull which followed the blast Comdr. R. O. Sala, our senior medical officer, administered first aid and amputated the captain's foot.

Then Captain Hoskins said, "Don't worry about me. . . . I hope you save her. . . . You deserve to!" Certainly gallant words from a brave officer.

The *Princeton* showed no signs of listing, which indicated that all major damage was above the water line. I still had hopes that the remaining fires could be put out and the ship towed back to port.

But the crippled *Birmingham* was obliged to back clear after the explosion. With no means left to fight the fires, we abandoned ship, first lowering the wounded into small boats from the destroyers. At 4:40 in the afternoon I left the *Princeton*, the last to go.

As I arrived aboard the *Reno*, a message came from our Admiral, "Destroy *Princeton*. Remaining ships rejoin task group."

His decision was justified. Besides the damage to the *Princeton* and her assisting ships, night was coming on and a Jap carrier force had been located not far away. Moreover, our fires were not out yet and we were still within easy reach of Jap aircraft and submarines.

So with sorrow the *Reno* fired torpedoes into the *Princeton* and she sank into the Philippine Sea with a last great explosion which lit the darkening skies for miles around.

It is difficult to express the feelings of one who has lost his ship—his home—with many fine shipmates. The one consoling fact was that our losses were but 10 officers and 98 men in our crew of over 1,500. For this I feel largely and deeply indebted to the cruisers *Birmingham* and *Reno* and destroyers *Irwin*, *Morrison*, *Cassin Young*, and *Gatling* for their efficient and devoted assistance.

Every captain believes his own crew is the best on any ship. I certainly feel that way about mine.

Capt. Hoskins Commands New *Princeton*

It is a pleasure to know that the Secretary of the Navy has selected one of our new large carriers, now building, to bear the proud name of U.S.S. *Princeton*. To her will go the gifts of prints, silver, and mementos contributed by Princeton people to our ship.

I am delighted also that the skipper of the new *Princeton* is to be Capt. John Hoskins, USN. I can think of no captain who will relish more the squaring of a personal debt with Japan.

Greens Grow for GI's on Soilless Ascension

By W. Robert Moore

With Illustrations from Photographs by the Author

THE United States Army has achieved a second notable victory on lonely Ascension Island in the South Atlantic.

First was the construction of a strategic airfield in its chaos of cinders and lava rock to serve as mid-ocean way stop and fueling base for warplanes flying between the Brazilian bulge and the African coast. An impossible task, some had said, but the Engineers did the job in three months!*

Now the Army's latest triumph is the growing of fresh vegetables on this barren volcanic ash heap for the GI's stationed here.

"Boy, is it good to sink my teeth into a real honest-to-goodness tomato again!" said one GI. "I haven't had one for nearly two years. And the lettuce and cucumber salads, ummm!"

I watched another lad enthusiastically piling lettuce leaves between two slabs of bread to make a huge fresh sandwich.

The face of everyone in the messes reflected the success of the gardens when the first harvest of vegetables reached the tables. Cucumbers, tomatoes, lettuce, radishes, and green peppers had become happily realized adjuncts to rations of tinned foods.

Vegetables from Cinders and Sea Water

Look at Ascension Island and you appreciate why the growing of green vegetables here makes news.

The whole island is one vast rust-red clinker thrust above the sea by some ancient spewing volcano. Thirty-four square miles in extent, Ascension is knobbed by forty fire-seared cones and is ribbed by broken lava flows and deposits of rough, sharp ash. Over much of the island even walking is difficult.

Virtually the whole area is as devoid of vegetation as the dump pit of a furnace, save where a few scattered cacti and thirst-tortured shrubs have found precarious rooting. Only atop Green Mountain, whose head rears 2,817 feet above sea level to be caressed by moisture-filled clouds, have grass, trees, and other verdure covered its nakedness.

On this green crown the few British families who normally dwell on the island, to maintain the cable station, plant their vegetable gardens and pasture their small herds of sheep and cattle. Here, too, in hillside catchments and reservoirs they collect the limited water supply that is piped down to the tiny village of Georgetown.

So limited, however, is this little hanging garden oasis that when hundreds of Americans arrived to build and maintain the airfield it could furnish neither water nor greenstuff for their needs.

Today the garrison has both. Distillation apparatus was set up to redeem drinking water from the sea. And now vegetables flourish in Ascension's cinders by the magic of hydroponics.

The Magic of Hydroponics

Hydroponics (water working) is the scientific name applied to soilless culture of plants, as it utilizes only water to which essential food chemicals have been added. For years scientists have experimented in such production and successfully grown plants independently of the whims of soil and rainfall.

Because of the island's desolation and the impossibility of shipping to the troops green foods by refrigerator ship, Ascension was picked by the Air Quartermaster of the U. S. Army Air Forces as its first testing laboratory for large-scale cultivation of vegetables by this method.

I was one of nine correspondents to fly to Ascension from Washington, D. C., as guest of the Air Forces, to see the first harvest.

In about 35 hours' flying time we skirted the Caribbean and the green Guianas, crossed the Equator and muddy mouth of the Amazon, and hopped halfway across the Atlantic from Natal. Some 6,500 flight miles distant from our own sprouting Victory gardens we saw the full fruition of this Army project, labeled "Hydroponics Station No. 1."

"What's this all about, bringing these fellows here?" we overheard one GI ask shortly after our arrival. "Haven't they ever seen lettuce grow before?"

We had! But never in quite the manner that green things were growing in the lush trim gardens set up in Ascension's volcanic waste.

Only a few months before, this garden plot had been a bare level space between rust-cindered hills where the GI's had marked out a baseball diamond. Now it had been converted into an 80,000-square-foot area of fertility by Engineers and enlisted air personnel under the direction of Mr. Kendrick W. Blodgett, a

* See "Ascension Island, an Engineering Victory," by Lt. Col. Frederick J. Clarke, National Geographic Magazine, May, 1944.

There'll Be Green Salad for Supper!—GI Gardeners Harvest Crisp Lettuce

These hydroponic beds on arid Ascension Island produce their first cutting about 42 days after planting. Four cuttings, 7 to 10 days apart, will be made from these plants. Then they will be pulled up and replaced by a new crop. About 1,000 two-ounce servings can be picked from a 100-foot bed.

civilian consultant from Terre Haute, Indiana (page 226).

Two methods of growing are practiced in hydroponics. One is a water culture in which plants are suspended above a screened tank so that their roots dangle freely in the chemical solution. The other utilizes a holding medium, such as gravel, for the plants, and the solution is fed periodically through the beds (actually shallow tanks) in a form of subsurface irrigation.

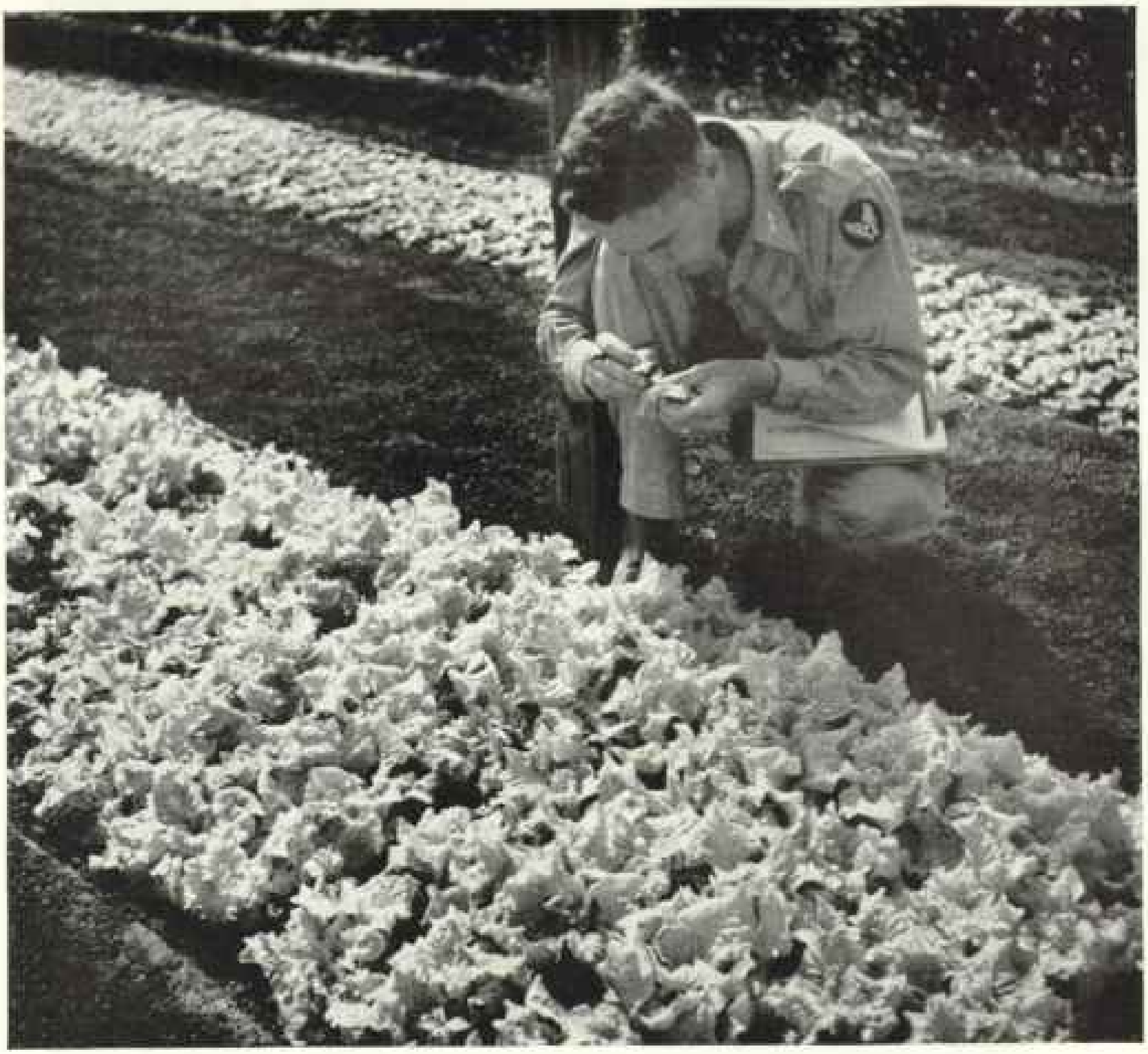
Gardens here on Ascension are of the latter type. Black volcanic cinders, dug from one of the near-by conical hills, are used as the aggregate, or holding medium, in the beds.

The gardens consist of four sections of 25 beds each, arranged in a slight terraced fashion so that the water can be successively drained from one section to the other from the top to the bottom of the garden. Sections also diminish in length from 115 feet in the upper section to 85 feet at the lowest one. This decreasing length is designed to compensate for the quantity of water absorbed by beds. Each section thus is exactly filled by the drainage from the one above it.

Individual beds, or tanks, are built of asphaltic concrete, 3 feet wide and 8 inches deep, and are spaced 4 feet apart; so as you look down the length of the garden you see 25 strips, 400 feet long, separated by dark cinder pathways (page 223).

Water Chemically Enriched

The soldiers who garden here are chemists and valve turners, rather than men with shovels and hoes. Water for the garden is enriched by small quantities of chemicals containing



What Kind of Bug Is Chewing This Lettuce Leaf?

The entomologist, 1st Lt. John S. Fisher, examines all vegetable beds to determine what insects are attacking the plants. Insecticide sprays are used to halt their destructiveness. The leaf rollers, tomato worms, thrips, and mole crickets found here apparently migrated from the gardens atop Green Mountain.

potassium, phosphorus, nitrogen, calcium, and magnesium. Some rare minerals appear in the cinders themselves.

This chemical solution is fed into the gardens through a 6-inch pipe from a reservoir on a near-by hill. Enough liquid is drawn into the upper section of beds to fill them. The water is then released by valves into the next section, and in turn is passed to the third and fourth blocks of beds, and finally drained into a sump for recovery and re-use.

Only comparatively small amounts of water and chemicals have to be added to maintain the proper volume and concentration of solution which is pumped again to the reservoirs.

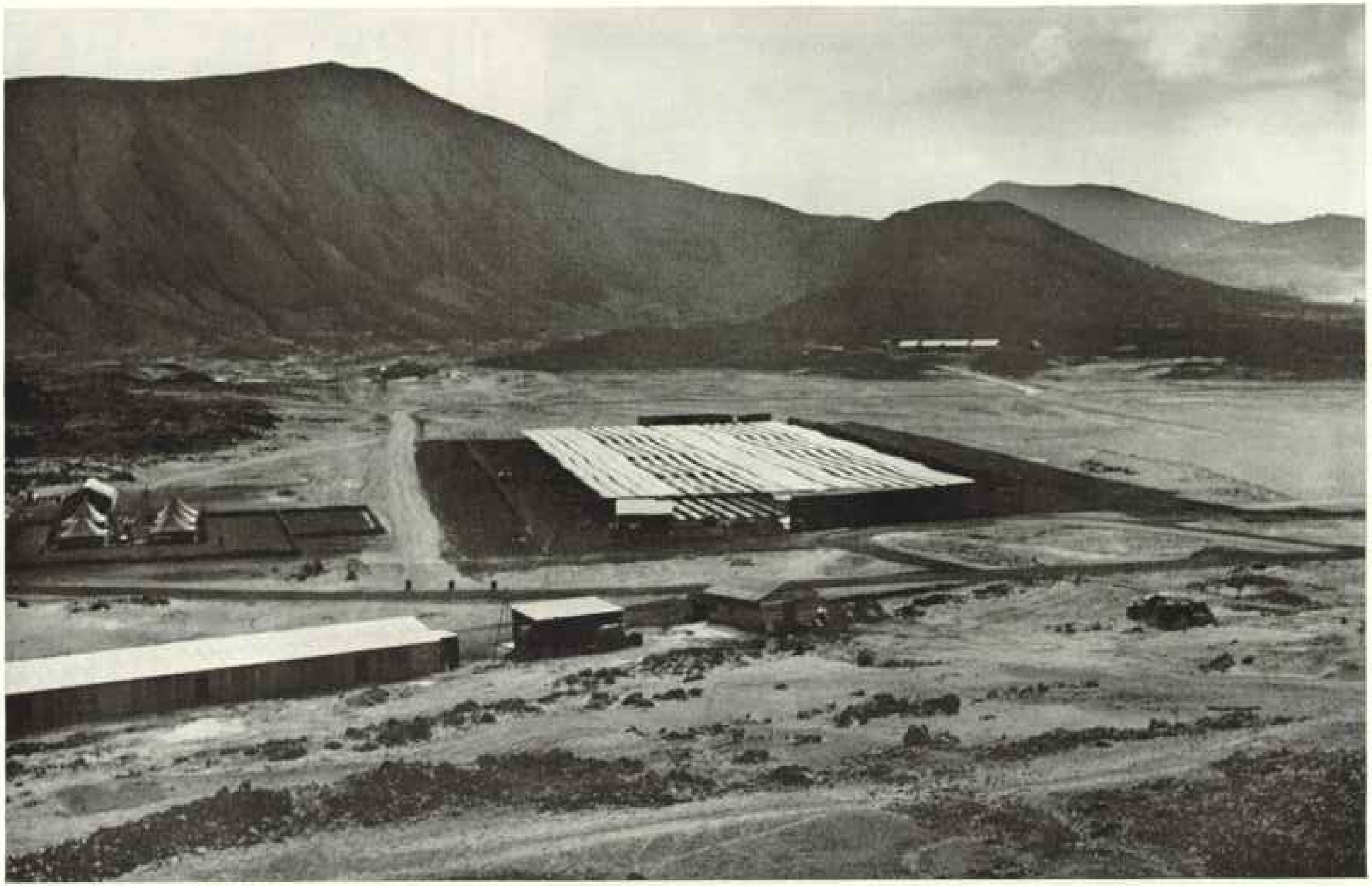
Water still is precious on the island. Every drop used in the project has to be distilled from the sea, as is that used within the camps. Consequently, it is carefully conserved.

Burlap is spread over the beds to reduce surface evaporation, and plants are grown through narrow slits cut in the cloth. Protected in this manner, the cinders retain sufficient moisture to require water "irrigation" only every other day.

Plants are first sprouted in small seedbeds of sand and such soil as could be collected on the island. A minimum of water is thus used in nourishing them to size for transplanting into the main beds.

As you look over Ascension's sun-baked, sterile landscape, you think immediately of the problems in your own Victory garden and reflect that here, at least, there can be no weeds, no bugs, or other pests to plague the GI gardeners.

Weeds, no. But from the moment that the first green plant stuck its tender head above

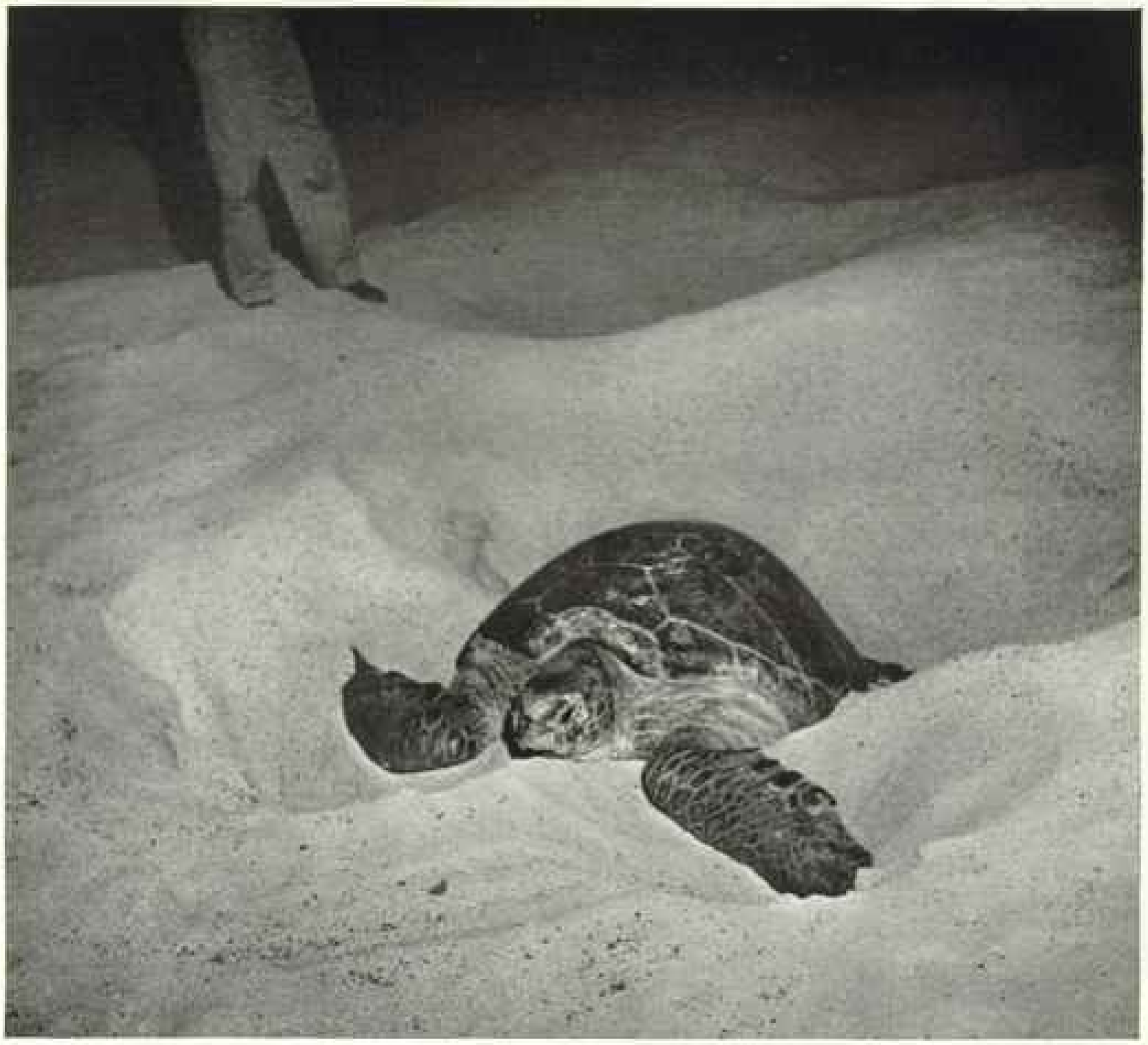


Where Nothing Grew in Ascension's Bleak Desert, the Army Now Tends a Vegetable Oasis

Narrow plant beds can be seen beneath the "roof" of cloth shading strips. The gardens are fenced to keep out roaming donkeys; on the windward side (right) windbreaks have been erected (page 226). The pipe cutting across from the right carries chemically enriched water to the gardens from a hill reservoir.

Only a Few Months Ago This Was Barren Land Where GI's Played "Sand-lot" Baseball

Green vegetables grow here now by the magic of hydroponics. Plants are set in cinder-filled concrete beds, or troughs, and are fed by chemically enriched water. The garden, 25 beds wide, is built in four slightly raised terraces so that water can drain from one section to the next. Over-all length is 400 feet (page 220).



A Giant Sea Turtle Deposits Her Eggs in Ascension's Beach Sands at Night

These huge creatures, weighing perhaps 400 pounds, dig deep holes with their flippers, deposit and cover their eggs, and then wander back to the sea (page 230). Depressions in the background reveal where other turtles have laid their eggs for sand incubation.

the seedbed a motley army of pests pounced on it. They, too, were hungry for a bit of vitamin-rich greenstuff!

To the banquet came a rare variety of thrips (a tiny bug with frazzled-looking wings), leaf rollers, tomato worms, and other creeping specimens (page 221).

Suspecting, too, that mice were guilty of chewing off the plants at their bases, the men set traps, only to find later that the villains were voracious, inch-long mole crickets which immediately perched on the traps to devour the cheese with which they were baited! Insecticides have halted the unwelcome feasting of this pest.

Fences, also, have been set up to keep the jackasses away. Many small donkeys, belonging apparently to no one, roam over the island to glean a scanty living. Only the few wild goats that somehow pick a living on the more remote volcanic slopes seemed unaware that the gardens had been planted.

Just when the pests were well under control and the plant beds were at their loveliest, an accident occurred which sickened both the plants and the men who had so patiently cared for them. When the solutions were made up one day, some calcium chloride instead of calcium sulphate was inadvertently used in the mixture.

The plants turned yellow from toxic poisoning, and it seemed that weeks of work would come to nought. Realizing what had happened, the men rushed to flush the liquid from the beds with fresh water.

At that time some of the water piping was still uncompleted, and the supply had to be hauled by truck. It was almost like trying to

How Do These Cucumbers Compare with Those in Your Victory Garden?

All GI's on Ascension agree that food grown by hydroponics is "pretty fine eating!" The sturdy vines are trained on vertical string supports, thus requiring small space in the garden. Plants begin producing 8 to 9 weeks after planting and can be picked continuously for a minimum of about two months.

quench a fire with an inadequate bucket brigade.

But the men worked feverishly and won. The harmful chemical was successfully leached from the beds, new solutions were put in, and the plants survived. Soon they recovered their color and vigor, and only a few showed more than slight aftereffects from the brief absorption of the chloride.

Bees Imported to Pollinate Plants

Although Ascension marshaled a variety of insects, it had no bees for pollinating the plants. But bees now buzz among the cucumber blossoms, for a hive was carried by plane from Brazil.

To an extent, tomatoes fertilize themselves, but a considerable amount of hand fertilization is being practiced on the plants. The men clip off the tips of the blossoms with a pair of scissors and smear them with a dab of hormone paste from a small syringe (page 229).

Such treatment ensures the growth of a large solid fruit without the extensive seed areas common to normally grown tomatoes. Some of the fruit that we sliced appeared almost as firm as an apple.

Several varieties of cucumbers, lettuce, and other plants are being grown in the first plantings, to determine which produces best under the particular conditions here.

The bulk of the radish crop, however, is the White Icicle variety, obviously named from their shape and color rather than for the mildness of their flavor!

"The bigger they are, the hotter they are, and the farther they go!" commented Mr.

Proof of the Project's Success Is the Fruit It Bears!

Standing at the laboratory doorway, Lt. Col. John D. Torrey, Jr., Commanding Officer, Mr. Kendrick W. Blodgett, civilian consultant, and Capt. Floyd C. Chitty, Engineer, smilingly examine boxes of fresh lettuce and cucumbers picked in the first harvest on soilless Ascension. Gratified by its success here, the Army is establishing hydroponic gardens at other isolated bases.

Blodgett when we sampled them. "But the boys love them."

Lying less than eight degrees below the Equator, Ascension has few changes of temperature in its yearly cycle. Seldom is there a day when the sun fails to shine its maximum, except on the cloud-crowned summit of Green Mountain.

Almost perpetually the island is fanned by a strong wind to temper the heat. Because the wind blows from one direction, the building of the airfield was simplified, as only a single-direction runway was needed. The breeze is so strong, however, that windbreaks had to be erected to prevent damage to the vegetables, particularly the tall tomatoes and the cucumbers which are trained to grow on vertical supports.

Sunlight Controlled, Too

The amount of sunlight which falls on the plants is also controlled by strips of marquisette strung lengthwise over the beds.

Because of the equable temperature the gardens can produce the full year round. Planting is staggered so that as soon as crops in some beds have borne their peak production others are ready for harvest. Spent plants are pulled out and new ones are immediately transplanted into the cinder aggregate. Obviously no bed preparation is necessary.

Although fighting in Europe has ended, Ascension will continue to be occupied by Americans for some time to come.

Ever since the airfield was completed in July, 1942, this lonely little mid-ocean dot has played a vital war role. Planes and materials ferried through here helped crush Rommel in North Africa. With its use we were also able to blast the Axis from Sicily and Italy and to amass the air might which so conspicuously contributed toward bringing Germany to unconditional surrender.

But Ascension is also a way station on that long air road to the China-Burma-India theater; so not until the last battle salvo is fired and American troops return home will its war task have been fulfilled.

Oddly enough, although it was discovered on Ascension Day, 1501, by the Portuguese João da Nova, the island remained unoccupied until another would-be conqueror of Europe, Napoleon, was exiled to St. Helena in 1815.

At that time the British government placed a garrison here as a precautionary measure against any attempt at Napoleon's rescue, for St. Helena is only some 800 miles to the southeast.

"Too bad that Hitler couldn't have been captured and made to sit out the rest of his time in exile here!" feelingly commented some of our lads who have spent more than two years on "the rock," as Ascension is commonly called.

Island Once a Warship

One afternoon when we climbed by jeep up the tortuous zigzag trail to the heights of Green Mountain to see the natural gardens growing there, we were invited to tea by the British Resident Magistrate, Col. J. E. Tomlinson.

As we drank tea and talked with the genial colonel and his gracious lady at their mountain lodge, I learned from them another bit of island history—that Ascension once was a warship!

A Needle-plying Sergeant Stitches Shade over the Vegetables

He sews strips of thin cloth to wires stretched on a framework over the garden. Thus the hot tropical sunlight that falls on the plant beds is regulated. Marquisette serves as a substitute for tobacco cloth.

From the beginning of British occupation until 1922 this volcanic lump was under control of the Lords Commissioners of the Admiralty; and as the Admiralty concerns itself with warships, the island was designated "H. M. S. *Ascension*"! Now it has been annexed to the colony of St. Helena.

Perched on a hill ledge above the green terrace of the Government lodge is the towered Red Lion Club, where the sailors who manned this "ship" drank their grog.

From the top of the mountain, covered with grass and studded with eucalyptus, Norfolk Island pines, and other trees transplanted here, you can look down over much of the island's Dantesque landscape.

On steep slopes midst the greenery sprawl irregular areas of concrete surfacing, used as the catchment for water. Before these were built, Dampier's Springs (now dry) were the only source of water on the island. The springs gained their name from William Dampier, the British navigator, whose ship foundered off the island in 1701.

A few scallops of coral sand edge part of Ascension's rocky perimeter. Some have grim names and associations.

There is Comfortless Cove, for instance, where a century ago yellow-fever victims were put ashore from ships. And there a few tilted stones mark the graves of crew members buried in the rocks and ashes. One of them was an American sailor from the U.S.S. *Constellation*.

Wheeling, Screaming Wideawakes Protest Man's Intrusion upon Their Rocky Nesting Grounds on Ascension Island

Sooty terns' eggs are laid on dry, open ground. Clouds hover over Green Mountain, 2,817 feet, furnishing moisture for its green cap, the island's only natural vegetation.

Pinch-hitting for a Bee, a GI Pollinates a Tomato Blossom with Scissors and Syringe

Tips of the petals are clipped off (left) and then a dab of hormone paste is deftly applied (right). Plants fertilized in this manner produce large firm tomatoes with few of the seeds so common to normally fertilized fruit. Sometimes hormone solution is sprayed on the blossoms. As Ascension had no bees, a hive was carried by plane from Brazil to pollinate cucumber blossoms (page 225).

Soldiers Kneel in Prayer at "the Grotto" on Barren Ascension

GI's built this open chapel on a small cleared space in an old lava flow. The roof of the grotto is constructed of lava blocks; the rest is rimmed with sandbags.

Ascension's beaches are attractive—at least to the sea turtles. Each year between January and May huge females crawl in over the lava rocks onto the sand to dig holes and bury their eggs (page 224).

One night while we were there, a number of us prowled a sand beach to discover some of these 400-pound mammoths. Following trails in the sand left by their flippers, shell, and dragging tail, we discovered three.

With their flippers they excavate a large hole in the sand, deposit their eggs, and, after scooping sand over the area, slowly wander back to the sea.

One of the correspondents, eager to see what the eggs look like, tried digging for them as soon as the turtle had moved a few feet away. An instant later the "Country Gentleman" got close to the soil.

The turtle, to conceal the last traces of her digging, flung a huge flipperful of sand straight into his face and open collar!

P. S. He never located the eggs!

Besides serving as a turtle incubator, the island is nesting grounds for myriads of wideawakes, or sooty terns. By tens of thousands they come here to roost and lay their eggs on the open ground. As you walk into the nesting areas the air becomes blackened by darting, screaming birds (page 228).

Engineers building the airstrip disturbed the birds, but failed to drive them away. Thousands insisted on parking on the end of the runway. Appropriately, the airfield was named "Wideawake."

The forces stationed on Ascension would rejoice at the opportunity of turning the area back to the wideawakes and letting the turtles enjoy the beaches in isolated seclusion. But for the present there is still a war job to do, and while they are there Uncle Sam will see that they have fresh vegetables to eat.

Notice of change of address for your National Geographic Magazine *should be received in the offices of the National Geographic Society by the first of the month to affect the following month's issue. For instance, if you desire the address changed for your October number, The Society should be notified of your new address not later than September first. Be sure to include your new postal zone number.*

Chinese, Hammering Rock, Turn the Good Earth into an 8,700-foot Runway Aimed at Japan

In 1944, China recruited 500,000 laborers to build bases for the American B-29's. They drained rice fields, quarried paving stones; in 90 days they completed four large fields and six small ones in the Chengtu area. Their achievement rivaled their ancestors' construction of the Great Wall.

U. S. Army Air Forces, Official

For Bulldozers They Use Water Buffaloes; for Power Shovels, Their Bare Hands

So limited were work animals that they were put on long-distance hauling. For short trips, men carried stones on shoulder yokes; some pushed them in wheelbarrows and rickshas. One base swarmed with 150,000 laborers.

U. S. Army Air Forces, Official

Though Roaring Motors Assail Their Ears, Airstrip Builders Are Too Busy to Glance Up at an Arriving C-47

Chipped to uniform size, each stone was laid by hand. The field will be smoothed by ten-ton rollers hewn out of solid rock and dragged by hundreds of men. Completion of half the runway enabled smaller planes to land. As if by mental telepathy, Chinese workers sensed the approach of Japanese air raiders. Almost before Intelligence had the news, the exit roads were blocked with fugitives.

On a Discarded Film Wrapper She Looks in Vain for a Picture

Women composed one entire labor brigade. Even children helped. Families lived in straw huts. Some walked hundreds of miles from home. Hard work never daunted the Chinese. Always they gave a "thumbs up" for Americans.

U. S. Army Air Forces, Official

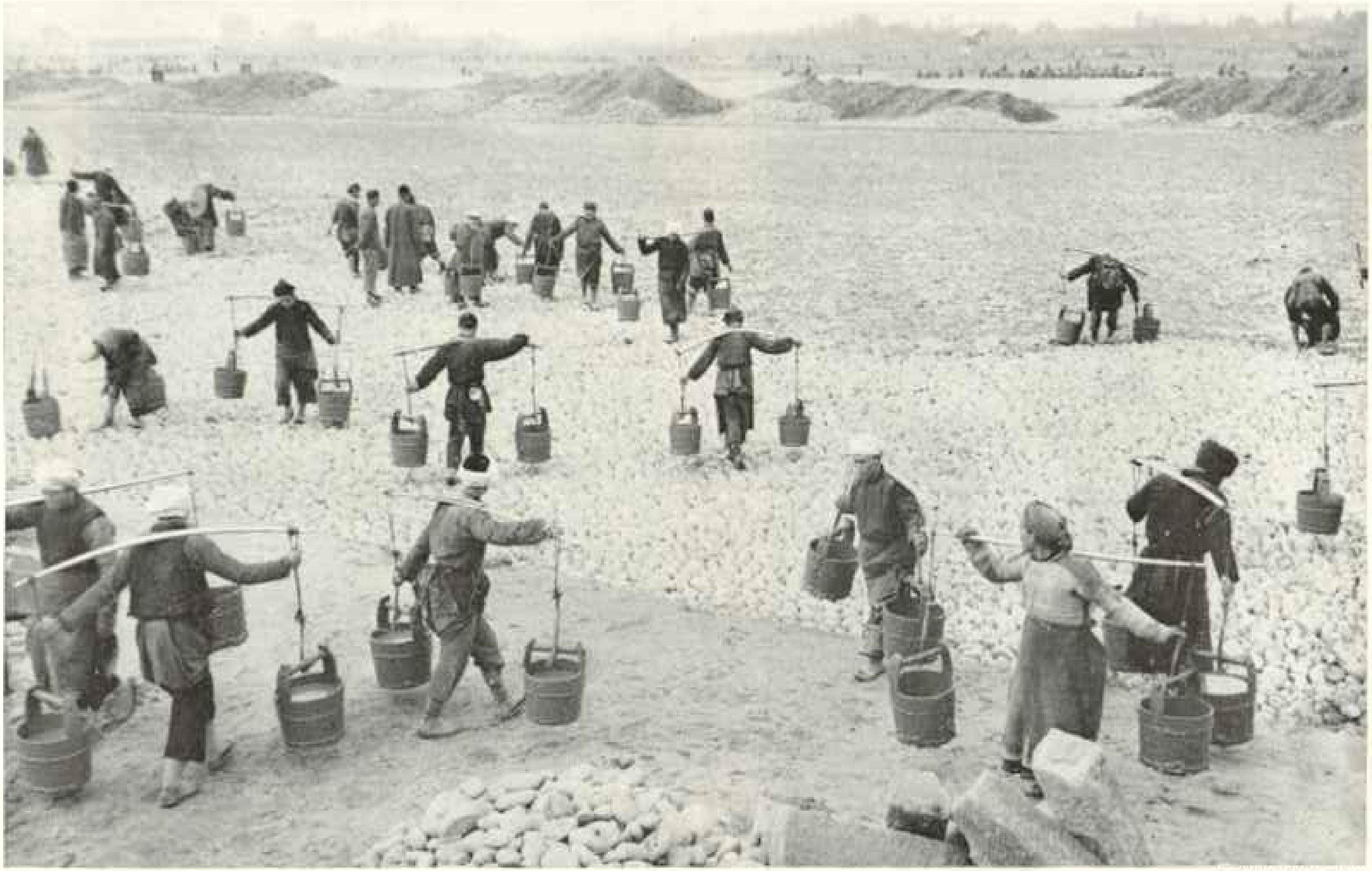
Mixers Ankle-deep in Mud Deliver "Cement" to Buckets

Trucks such as these U. S. Army machines were luxuries. Some were flown in piece by piece. Gasoline, too, came by air. Recently the laying of a pipeline from India has helped the fuel problem.

U. S. Army Air Forces, Official

Kicking Up a Shower of Mud, a C-87 Lands Beside an Unfinished Runway with Supplies from India

From such strips, some 80 B-29's pioneered land-based raids against Japan in June, 1944. A year later China-based Superfortresses migrated to the Marianas, which are closer to Tokyo and more easily supplied. No B-29 base was ever lost. However, the Americans were forced to blow up and abandon lesser fields in southeast China.



Acme by Frank Carrollara

Bamboo Poles Bend Like Bows under Buckets of Mud, the Glue That Binds the 8,700-foot Runway

Poured into cracks and sun-dried, mud keeps the rocks from shifting. Heavy blocks (right) are foundation stones. Over them cobbles are spread. Smaller sizes form the crust. Twenty inches thick, this stony carpet took 100,000-pound blows from B-29's without a dent. Foremen for some gangs kept human timecards by stamping the arm of each worker with his haulage record.

U. S. Army Air Forces, Official

An American Pays a Candy Bonus to His Labor Gang

Twenty-six Air Force engineers, living Spartan lives in shacks, supervised construction. One officer, only Yank on his field, wrote contracts, settled labor disputes, made reports by candlelight, and learned to speak Chinese.

Artist: Frank Cassellaro

At Noon a Human Triangle, Connected by Poles, Carries Rice

Lest time be lost going to and from lunch, commissary men take food to workers on the runway. Their own rice crops worried the farmer-laborers; they worked for release before the day that planting had to begin.

American Alma Maters in the Near East

By Maynard Owen Williams

With Illustrations from Photographs by the Author

A FEW miles above Istanbul the swift Bosporus courses between two old castles, Rumeli Hissar, built by Mohammed, conqueror of Constantinople, forty years before Columbus discovered America, and Anatoli Hissar, of somewhat earlier date.*

At these narrows a strong swimmer can cross from Europe to Asia in eleven minutes, a distance of only 800 yards. To the north the 20-mile channel reaches its maximum breadth of a little more than two miles as it empties into the Black Sea.†

On a clear day Robert College students can gaze across the narrows of this beautiful waterway and watch Anatolian farmers tending gardens beside the Sweet Waters of Asia, more formally known as the Göksu. Once this river valley was the favorite picnic ground of harem beauties on their days off.

From their side of the Bosporus residents of Anatoli Hissar (Asiatic Castle) can see tiny figures, dwarfed by the time-worn walls of Rumeli Hissar, or count the tombs of those who, even in death, cuddle close to its mighty battlements (page 242).

Higher on the steep slope are the gray buildings of Robert College, where young Turks learn English spelling, the secrets of chemistry or physics, the themes of symphony and oratorio, or the intricacies of a Diesel engine.

Past the site of Robert College, Jason sailed in search of the Golden Fleece. Now its embryo engineers seek the sheepskin which will enable them to continue their studies at Cornell or M. I. T. (page 240).

Dr. Cyrus Hamlin, missionary and versatile educator who founded Robert College, believed in practical education and practiced a religion of good deeds. While Florence Nightingale set new standards for nursing the miserable veterans of the Crimea at Scutari (Üsküdar), Hamlin deloused their sorry uniforms and baked them wholesome bread.

Christopher Robert, an American visitor, saw Hamlin's crisp-crusted loaves in a region whose traditional sheet bread resembled a rubber bath mat. Curious about the origin of the loaves, Robert searched out the maker.

As he listened to Hamlin's dreams of an American college in the empire of the sultan, he learned something new about missionary work. And he gave his name and money to this outpost of American education.

Now from Istanbul to Van the Turkish Republic is developing its own splendid schools and universities, but the college still attracts young men intent on familiarizing themselves with American education.

At Robert College today Turkish Army officers are studying Shakespeare and Lincoln's Gettysburg Address.

When I heard several of the young officers make speeches in English only six months after their first lesson, I had to remind myself that our language is not theirs.

If the younger students are cooperative about talking English outside classes, they are taken to a downtown cinema, where they can see and listen to current Hollywood favorites. American instructors know how to sugar-coat a pill, even as bitter a one as English grammar.

Our statesmen, as well as our educators, realize the value of such foreign schools in preparing young men for advanced work in American universities and in spreading democratic thought. For fourscore years this same conviction has spurred American teachers in the Near East and the farsighted benefactors who have rallied behind them.

Geographic's Editor Born on the Bosporus

On my return to the Asiatic side of the Bosporus, I went back to a favorite pine-framed lookout and gazed across at the dead fort and living school. Beside them, almost hidden by trees, a twin-gabled house has a special interest for National Geographic readers.

There lived Dr. Edwin A. Grosvenor, distinguished professor of history at Robert College from 1873 to 1890. His two-volume *Constantinople* has never been equaled. In that house his sons lived as boys. Every day the young Grosvenors, their minds directed by the keen historic sense of their father, could look out upon two continents.

The waterway that so beautifully separated Asia from Europe was known to Darius, Xenophon, and Alexander the Great. Here, Greek mythology tells us, Io, mistress of Zeus, fled the wrath of Hera. In the form of a

* See "Summer Holidays on the Bosporus," by Maynard Owen Williams, in the National Geographic Magazine, October, 1929.

† See map supplement of "Europe and the Near East," with the June, 1943, issue of the National Geographic Magazine.

Long Forbidden, Graven Figures Surround Art Students in Progressive Turkey

Like the alumnae of the last 70 years, these students at Istanbul Woman's College are destined to carry on the emancipation of Near East women. Right: the stone lion's face is blackened by smoke. As it has mouth and "windpipe," the girls use it as a cigarette holder.

white heifer she swam the strait, the "ox ford" which gave the Bosporus its name.

Before the future president of your Society went home to America, his eyes were focused on scenes of many lands and his ears tuned to the babel of tongues then spoken on Galata Bridge.

He had seen caïques, with oar handles shaped like well-filled bobbins, carry Constantinople's commuters into their very homes, for only here and there does the Bosporus have even a narrow beach.*

He had climbed the hill where the Pektaşi dervishes had their monastery, surrounded by dark cypress trees, and where skeleton-white tombstones marked the green ridge under the blue sky.

His nurse was an Armenian. Kurdish *hamals* (porters) toiled up the cobbled paths, carrying provisions to his home. Albanians, Bulgarians, and Greeks were his classmates in Robert College.

During the pilgrimage season, from Samarkand and Bukhara came flat-faced followers of Mohammed in rainbow robes, on their way to pay a duty call in Mecca, then still in Turkish hands.

Little wonder that geography seemed to Gilbert Grosvenor a dramatic series of living pictures, rather than mere dots on a chart.

Ambassador Grew's Tactful Touch

Even Hamlin never dreamed of the day when the first Turkish graduate of Robert College, Hüseyin Pektaş, would go to the Lausanne Conference as confidential secretary to İsmet İnönü.† Nor could he guess that the college's third president, Dr. Caleb Frank

* See "Constantinople and Sancta Sophia," by Edwin A. Grosvenor, and "The Gates to the Black Sea," by Harry Griswold Dwight, both in the National Geographic Magazine, May, 1915.

† See "The Turkish Republic Comes of Age," by Maynard Owen Williams, in the National Geographic Magazine, May, 1945.

No Wonder the Turkish College Girl Seems Modern. See What She Reads!

A new world of thought is opened to her by the library of Istanbul Woman's College, formally known as the American College for Girls. To this student the NATIONAL GEOGRAPHIC MAGAZINE (left) is as familiar as *Aksam*, the Turkish newspaper (lower right). A neighbor of Robert College, the girls' institution sits on the Bosporus at Arnautköy. Two world wars did not shut it for a single day (page 245).

Gates, would serve as unofficial adviser to Rear Adm. Mark L. Bristol, American high commissioner to Turkey from 1919 to 1927, and to Joseph C. Grew, who succeeded him as ambassador.

Ambassador Grew, with characteristic tact, found ways of expressing his regard for Turkey. When his daughter Anita was married, he asked Istanbul's mayor to perform a Turkish marriage ceremony in addition to the Embassy wedding.

Last year, when my own son was married under Turkish law, his Turkish sponsor reminded him that he was following a friendly example.

On my way I halted at Adana, where a young stranger translated a Turkish welcome.

"Where did you learn English?" I asked.

"At Robert College."

"Do you know a George Williams there?"

"He is my teacher."

"Is he any good?"

"Oh, yes, sir. He takes us on hikes. He is my friend."

"And I'm his father."

Then we really shook hands.

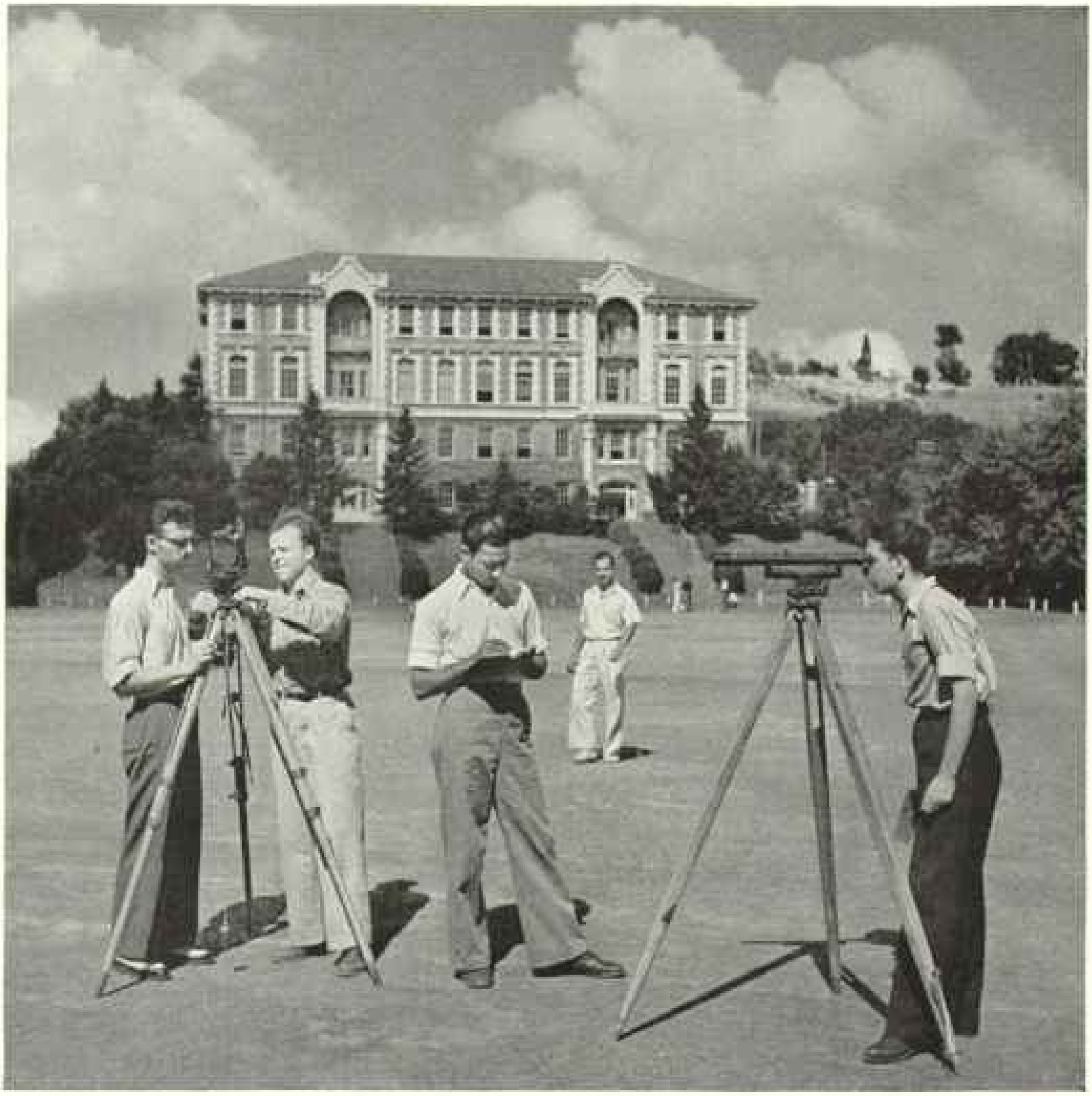
No wonder my fondness for Turkey amazes those who still picture a Turk as a musical-comedy character, wearing a jeweled turban and voluminous trousers and surrounded by adoring females.

How surprised they would be to find themselves in a taxicab with a radiant Turkish girl and to learn the reason for her happiness was that she had just passed her law exam.

That did happen to me.

College Overlooks "Albanian Village"

Even closer to Istanbul's high-domed hills than Robert College, a shoestring village squirms along the curving waterfront. It is called Arnautköy—Albanian Village.



Student Surveyors Set Up Their Instruments Before Anderson Hall, Robert College

Geared to Turkey's industrial needs, the Engineering School teaches young men to build railroads, highways, bridges, factories, power plants, and sewage systems. Graduates are in demand. Though engineering instruction is in English, students must learn Turkish technical words lest they be handicapped on leaving college. To aid them, a former dean compiled a dictionary of 10,000 engineering terms.

Above it, amid the trees and gardens of an old estate, the five magnificent buildings of Istanbul Woman's College—Russell Sage, Henry Woods, Mitchell, Gould, and Bingham Halls—stand in an imposing row. To help build them, strong-shouldered oxen, with flowers behind their ears, hauled an American stone crusher up that steep slope.

Hamlin quarried the material for his first building from the site on which it rose. Before mixing sand, crushed brick, and lime for cement, he analyzed the tough mortar of Constantinople's centuries-old, embattled walls. Then he used similar proportions in the dormitory which bears his name.

At Arnautköy the rocky hillside yielded to the noisy crunch of the stone crusher and the chatter of colorful gangs of laborers.

Thus, after a long and useful life at Scutari, Istanbul Woman's College (formally known as the American College for Girls) was splendidly housed on the European shore, with its Rockefeller heating plant to temper the chilly Black Sea winds.

From this high shelf the new college looks across to its old site between Florence Nightingale's hospital and Beylerbey Palace, built shortly before the arrival in 1869 of the Em-

Serving Without Pay, Beirut Medical Students Treat the Sore Eyes of School Children

In these volunteers the American University of Beirut has implanted a sense of responsibility toward the poor. Into refugee camps, schools, and factories they go with vaccines and health talks. Trachoma, an eye disease, is their persistent enemy. They fight typhoid, paratyphoid, and malaria. In one summer 20 students gave 20,000 typhus shots. During a smallpox epidemic others vaccinated a desert tribe (page 250).

press Eugénie, glamorous granddaughter of William Kirkpatrick, American consul at Málaga.

During her stay at the beautiful white marble palace, the Empress occupied a suite of rooms decorated exactly like those in her private apartment at the Tuileries.

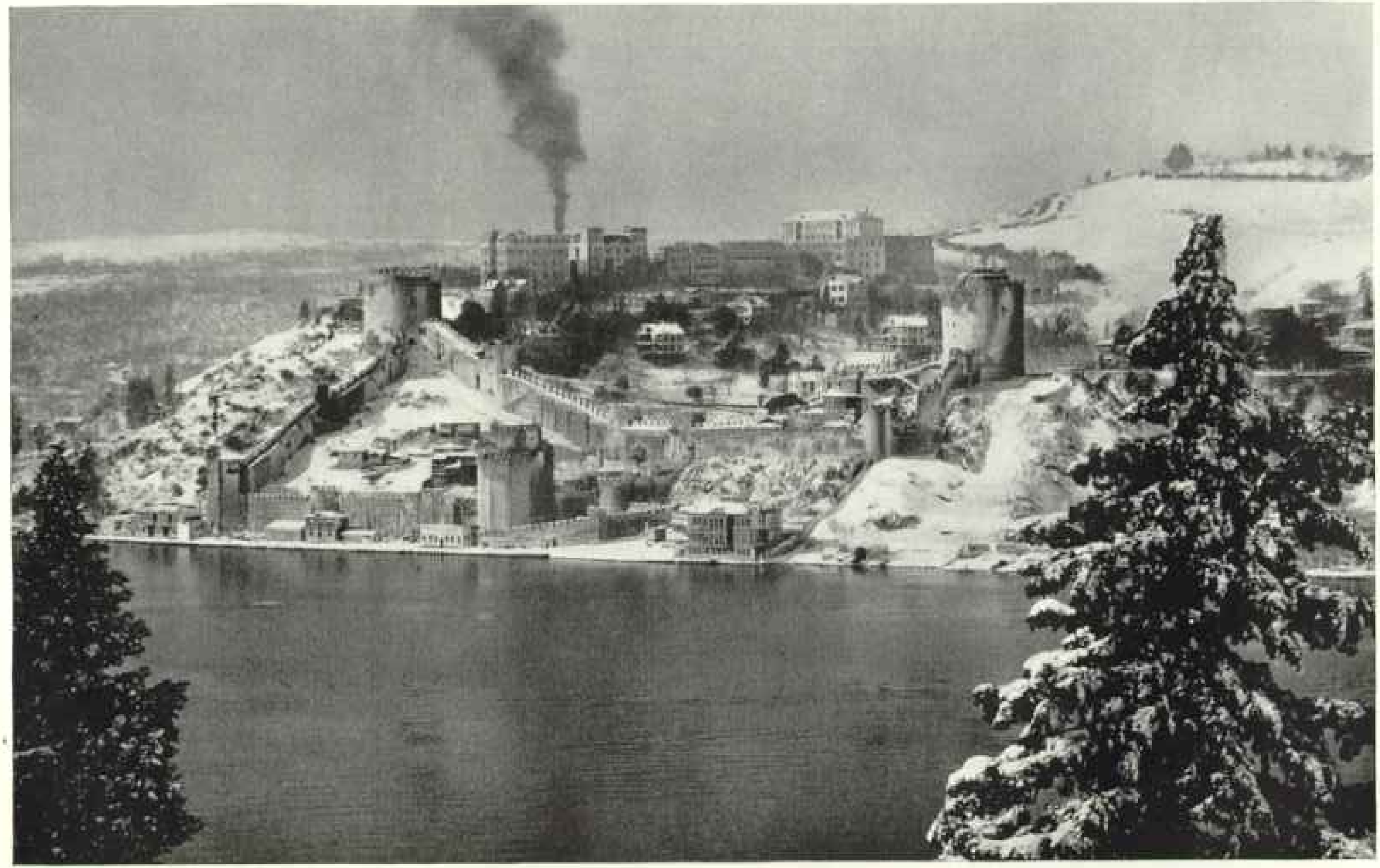
That fascinating lady of the hats was on her way to preside at the opening of the Suez Canal, built by a relative, Ferdinand de Lesseps.

Those were the days when Constantinople was the third city of Europe; when Turkey's navy was third in the world; when 900 wives and concubines, guarded by 300 eunuchs, crowded a harem through whose portals passed the most beautiful women of the East —to stay. Life was still leisurely and gay beside the beautiful Bosporus.

In the early 1870's higher education for women in the United States was in its infancy. Yet Americans were already devoting their lives to the education of their Turkish sisters.

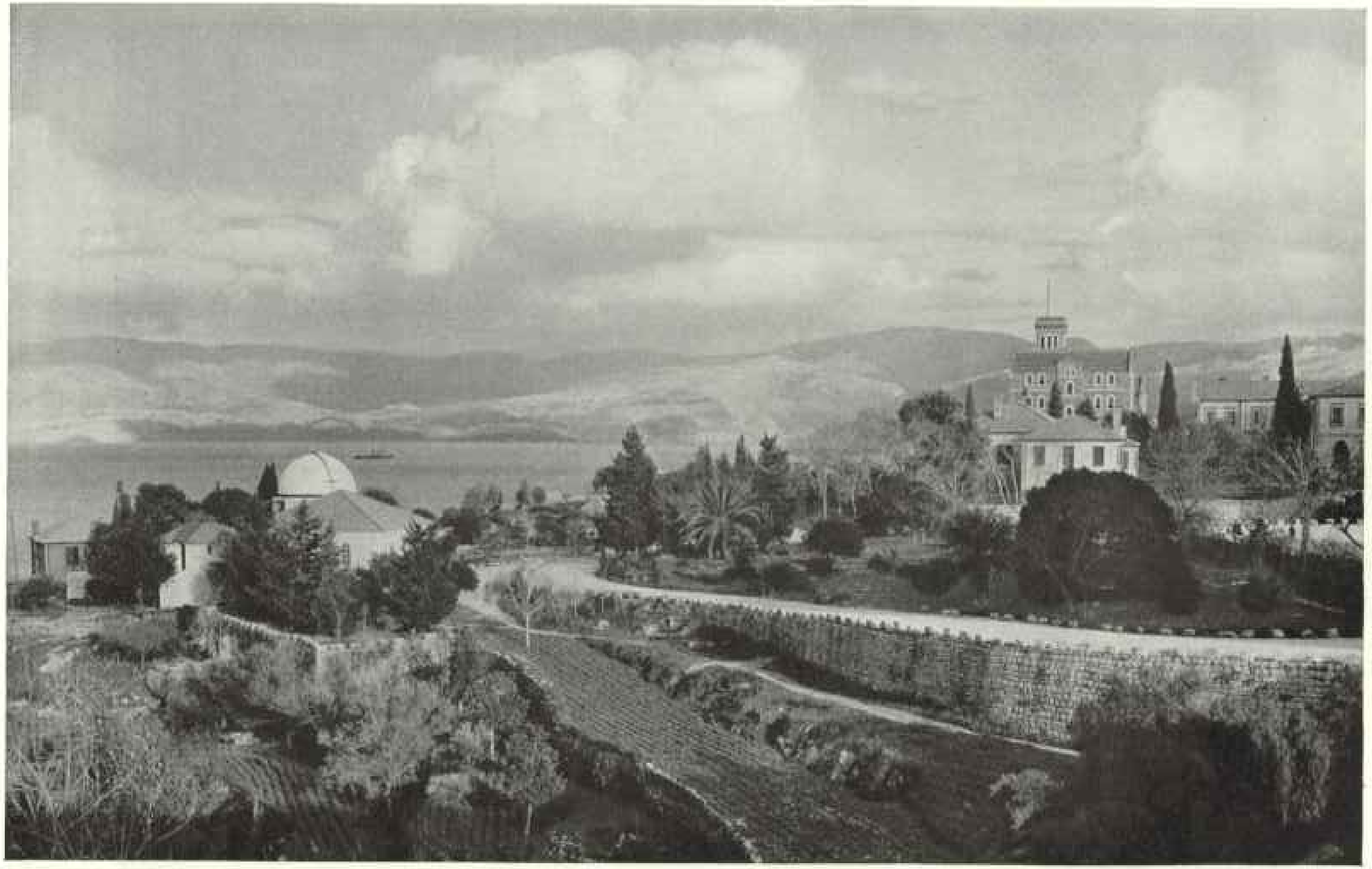
One of them was Dr. Mary Mills Patrick, whose story of 53 years of service, *Under Five Sultans*, is fascinating reading.*

* See, in the National Geographic Magazine, "Asia Minor in the Time of the Seven Wise Men," January, 1920, and "Emancipation of Mohammedan Women," January, 1909, both by Mary Mills Patrick.



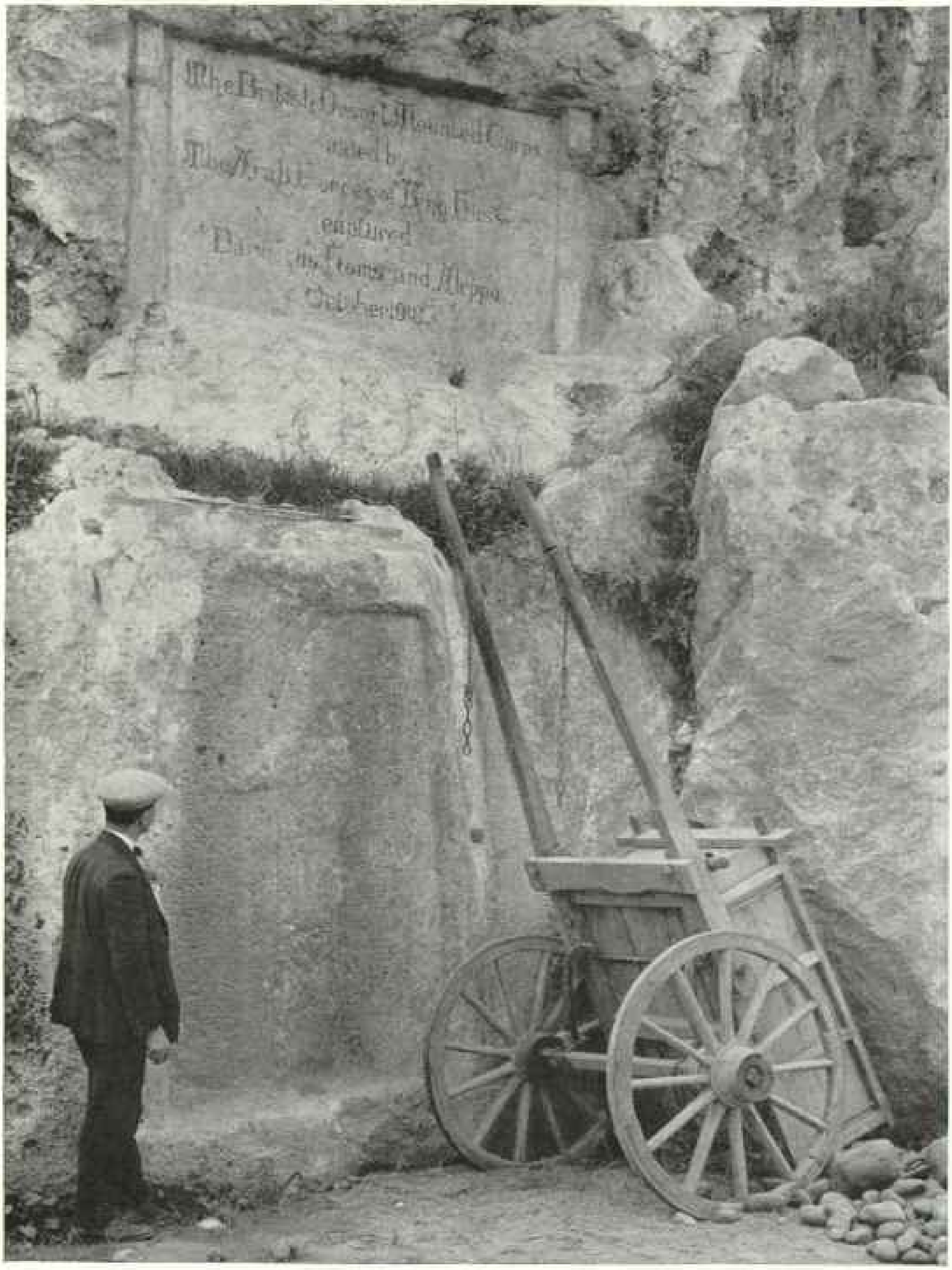
Seen from Asia, Robert College Stands above Rumeli Hissar, the "European Castle" Built by the Turks to Control the Bosporus

These buildings, old and new, are monuments to two innovators. Sultan Mohammed II, the Turkish conqueror who established Islam in Constantinople, created the fort in 1452. Dr. Cyrus Hamlin, who carried American higher education to the drowsy Ottoman Empire in 1863, created the college. Snow is not surprising; near-by Istanbul (Constantinople) lies in New York's latitude. Sometimes the Bosporus is covered with Black Sea drift ice.



Looking Across St. George Bay, the American University of Beirut Faces the Lebanon Range, Home of King Solomon's Cedars

For more than half a mile the university's buildings line the blue Mediterranean. Right: the tower of the school's first building; beside it, the president's home. An observatory (dome at left), housing a 12-inch telescope, points toward the Dog River, said to have been named for a large stone dog which barked at an enemy's approach. The bay is named for St. George because Beirut legend says it was here that he killed the dragon and stuffed it down a well.



Beirut Students May Read 30 Centuries of History from the Rocks Carved by Conquerors

This way marched the hosts of Egypt, Assyria, Greece, Rome, England, France, and other nations. Some left sculptures or inscriptions, the most recent commemorating an Allied victory in 1942. The eroded stone figure is believed to represent Ashurnazirpal III, an Assyrian king of the 9th century B.C. Cities mentioned in the 1918 tablet saw strife again during the 1945 Syrian-French crisis.

During her term as president of Istanbul Woman's College, Dr. Patrick saw the present palatial buildings dedicated, June 3, 1914. Before that first glad summer vacation was over, Europe was ablaze. The Turkish Army looked with longing on these fine new buildings. But the college was dedicated to female education, and throughout World War I, as during the present conflict, it persevered in its purpose with amazing success.

Food and clothing were lacking. For more than a year the American teachers at the two colleges on the Bosporus got no letters from home. Yet they carried on.

Although allied with Germany, Bulgaria early showed its gratitude to the schools which had trained so many of its leaders by shipping flour, beans, and other provisions there. A lenient Turkish government permitted delivery of the supplies.

Even after the United States entered the war, the colleges remained open, though British and French schools were closed and occupied.

World War I Brought New Freedom to Turkish Women

From early days Turkish women could defend their own property in court. And since they were secluded from all but family activities, they turned naturally to the study of medicine, especially childbirth.

With its manpower mobilized and many of its sons dead at Gallipoli, Turkey sought the assistance of its women for new tasks. Veils became thinner, encumbering skirts shorter. Girls took their places behind counters in Istanbul.

The war ended as suddenly as it began. On October 30, 1918, Turkey signed an armistice aboard the British warship *Agamemnon*, outside Agamemnon's Troy.

Defeat had come to a German-dominated remnant of an Ottoman Empire which had once reached from the Adriatic to the Persian Gulf and around the curve of the Mediterranean to the edge of Morocco. Speculation was curbed. Commerce flowed again. Something like prosperity returned to heal resentment and the wounds of war.

On our campuses beside the Bosporus, tolerance had long been the rule. Time and again the fathers and brothers of these young men and women had fought in opposing armies.

Dr. Patrick tells the story of two of her students during the Balkan Wars. One of them, a Turkish girl, said, " 'My father is a general in the army.'

"The Bulgarian girl replied, 'My father is a general, too. That makes us sisters, doesn't it?' "

In his inspiring *Not to Me Only*, Dr. Gates records another such anecdote. "A boy from one Balkan country said to a fellow student from an enemy country: 'If I were to meet you in the mountains of Macedonia, it would be my duty to shoot you, but here we will live like brothers.' "

Statesmen, desirous of lasting peace, know that in our Near East colleges such international fellowship has been practiced for many years.

This year 94 percent of the students of Istanbul Woman's College are Turks.

Avid readers of "harem life" romances would never believe it. As I saw these merry-eyed, bare-legged Turkish girls come trooping down the flowery pathway from Gould Hall, on their way to basketball practice, I could hardly believe it myself. Their graceful coach, in spotless sweater and shorts, took her physical education in America.

Their conversation as well as their appearance sometimes surprised me.

"Is Duke Ellington really as good as his press agents say?" asked one attractive miss.

"Who is?" I countered. And no Wellesley girl could have flashed a quicker grin.

The Gould Hall library caters to every taste; no reputable literature is banned.

Alumnae Influential in Near East

The Istanbul Woman's College and Robert College are now combined in the Istanbul Amerikan Koleji, made up of the Kiz Kismi —Girls Section—and the Erkek Kismi—Boys Section.

This has given rise to an atrocious trilingual pun, gaily relayed to me by the scholarly dean, Dr. Eleanor I. Burns:

"The girls kiss me and the boys kiss me; no wonder I'm called Alma Mater."

And alma mater she has been to a varied family of daughters who have helped transform the several lands carved from the Ottoman Empire.

The first Turkish graduate of the Woman's College was Gulistan Ismet, daughter of a Turkish colonel and a Circassian beauty from the disbanded harem of Sultan Abdul-Aziz. Having seen his heavily veiled daughter receive her diploma, her father was exiled. "Rose Garden" herself was marked for punishment because of her liberal writings.

In 1928, just before Turkey adopted its new alphabet, Halidé Edib Adivar, Turkey's first feminine Bachelor of Arts, was asked to play a major role at the Institute of Politics in Williamstown, Massachusetts. She was

Russell Clancy from Press Assn

Beirut Alumni Are Prominent at the United Nations Conference

In San Francisco the spell of their distant alma mater has brought together these graduates of American University of Beirut and guests. Four wear buttons of United Nations delegates. Among them are Naim Antaki, Syria's Finance Minister (front row, left) and, beside him, Faris al-Khouri, Syria's Prime Minister. Several, from Iraq, study agriculture at the University of California.

the first woman to receive such an invitation.

Sahire Muhtar Şilli, Cornell Ph.D., was the first Turkish woman to win that degree in an American university and is the only Turkish member of the Society of Woman Geographers.

Other graduates, returning to Greece, Albania, Bulgaria, Austria, also embarked upon distinguished careers.

Separated by Bebek Bay and nearly an hour's walk apart, these two colleges do not yet have coeducation. The nearest they come to it is in the pages of the college yearbook, where pretty girls and handsome young men appear side by side.

Full-fledged Coeducation Begins

In the Lebanon and Syria, the Moslem veil—worn a bit thin nowadays—is still in use. But on the lovely campus of the American University of Beirut are scores of coeds unveiled, though many are Moslems.

In 1924-25 full-fledged coeducation began at the A. U. B, when seven somewhat self-conscious girls entered the School of Arts and Sciences. Last year there were fifty-four, all very much at home in classroom and laboratory.

I photographed a Polish girl from Lwów in front of some bougainvillea.

"How do you like it here?" I asked.

"It's heaven!"

Of 632 women students since coeducation began, 106 were Moslems, 104 Jewish, 24 Druse, 8 Bahai, and 2 Hindu. The other 388 were Christians.

The university once had a strange bequest. A father wrote:

"In the name of the Lord Jesus Christ, I present my son Benjamin as a gift to your university."

Some method short of slavery was worked out and Benjamin entered the university.

In Beirut the Bible Lands' Clashing Races and Creeds Meet in Brotherhood

Seated (l. to r.): French Christian, Syrian Christian, Lebanese Druse, Lebanese Christian, Iraqi Jew, and Palestinian Moslem. Standing: Armenian Christian, Trans-Jordan Christian, Palestinian Christian, Syrian Christian, and Lebanese Moslem. The statue is of Daniel Bliss, founder in 1866 of Syrian Protestant College, now the American University of Beirut. From its original 16 students it has grown to 2,400, representing 38 nationalities (page 252).

Later he got a job with Socony-Vacuum in Sofia. During recent confusion in that city one man stood out for his efficient helpfulness. He was the "Benjamin" whom the A. U. B. could not accept as a gift.

Rustum Pasha, once Turkish Governor General of the Lebanon and later ambassador to the Court of St. James's, said to the president of the university, "You make men."

Tiny Lebanon Republic Rich in History

The Lebanon, whose complete independence was accorded full recognition by the United States in September, 1944, is a small republic, about 125 miles long and 40 wide, with a population of nearly a million, about half of whom are Christians. Its snowy spine is the Lebanon range, from which this neighbor of Moslem Syria takes its name.

This is no ordinary mountain, facing an insignificant sea. The rocky, inhospitable coast pushed the ancient Phoenicians to fame and fortune in their far-ranging ships. Across the Mediterranean the cockleshell craft of Tyre and Sidon boldly plowed a virgin wake past the forbidding Pillars of Hercules, guarding the eastern entrance to the Strait of Gibraltar.

Rounding the tip of Spain in search of tin and other metals, the Phoenicians sailed up the coast as far as the Cassiterides, now believed to be the Scilly Islands, off the southwest coast of England.

About midway along the coast of the Lebanon, the proud city of Beirut (Beyrouth) sits on the high-arched back of a wide promontory. To the south, red sands which threatened to engulf the city were pegged down by green-umbrellaed pines and are now marked by the black cross of the airport landing strips.

To the north is the bay where St. George

A Talented Syrian Boy Decorates His School Walls with Pictures of Primitive Man

Born in England, he had no difficulty fitting into the Elementary School of the American University of Beirut. However, another boy, fresh from the Arabian peninsula, had to learn to switch on lights and tie a cravat. How to take a shower without scalding himself and how to sleep on a spring bed puzzled him. He was scandalized by girls playing tennis in shorts.

killed the dragon (page 243). A. U. B. students, on their way to bathe in its deep-blue water, pass through a private tunnel under the seaside boulevard.

Beside it is the finest athletic field within a thousand miles. On the north-facing slope are more than a score of splendid buildings, serving a student body of 2,400.

For three years I was the first occupant of the top corner room in Sage Hall. Standing at my northeast window, far above the prickly-pear hedges and throbbing band drums, I could imagine that I was present at the birth of history and world trade.

Tyre and Sidon were out of sight, but I could figure out the spot in the near-by town of Djebeïl where a Crusader castle rose above a ruined temple of Egypt's Old Empire.* One of the oldest places in the world, Djebeïl was known to the ancients as Gebal, to the Greeks as Byblos, and to the Crusaders as Gibiet. From here, long before Hiram of Tyre supplied the precious wood for Solomon's Temple, cedar was shipped to the valley of the Nile.

Today a remnant of the ancient forests is a center for winter sports. Curving ski tracks mark the glistening slopes under the horizontal limbs of the mighty Cedars of Lebanon.

Facing my window, only a few miles away, limestone cliffs split by the Dog River (Nahr el Kelb) plunge steeply into the sea. On passing this rocky barrier with his armies,

* See "Crusader Castles of the Near East," by William H. Hall, NATIONAL GEOGRAPHIC MAGAZINE, March, 1931, and "Road of the Crusaders," by Harold Lamb, December, 1933.

one conqueror after another left a carved record of his achievement (page 244).

This rugged page of history holds the story of more than 3,000 years, from the time of the Egyptians, Assyrians, and Babylonians down to the Anglo-French occupation of 1918 and the Allied tablet of 1942. What boldness it must have taken to carve a modern inscription on rocks bearing cuneiform and hieroglyphics dating back to the days of Sennacherib and Nebuchadnezzar II!

Byblos gave us the word "bible." Appropriately enough, Beirut distributes Bibles to the entire Arabic-speaking world. From the American Mission Press go countless copies of our Holy Book. This translation was begun by Eli Smith and completed in 1864 by Dr. Cornelius V. A. Van Dyck and is printed in a font called American Arabic. Before the university was founded, Beirut had become the center of an Arab awakening.

Amherst Man Founded Syrian College

Thinking has changed greatly since 1871, when Dr. Daniel Bliss, Amherst-inspired founder of Syrian Protestant College (A. U. B.), laid the cornerstone of College Hall. But his words on that occasion are still remembered and practiced:

"This College is for all conditions and classes of men without reference to color, nationality, race or religion. A man white, black or yellow; Christian, Jew, Mohammedan or heathen, may enter and enjoy all the advantages of this institution for three, four, or eight years; and go out believing in one God, in many gods or in no God. But it will be impossible for anyone to continue with us long without knowing what we believe to be the truth and our reasons for that belief."

His son, Dr. Howard Sweetser Bliss,* who followed the saintly "Dr. Daniel" as president, wrote a noteworthy study of *The Modern Missionary*, in which he said, "It is our purpose to render ourselves not indispensable, but *dispensable*." In view of the increasingly international character of the A. U. B., this seems unlikely.

Neighboring states send their young men and women to Beirut not only to benefit from American teaching but also to make contacts with American life, to gain help in obtaining American refrigerators, dental supplies, surgical equipment, or the manifold products sold in our corner drugstores.

American ice-cream parlors long since took Beirut by storm. And a very successful five-and-dime store is run by A. U. B. alumni. Current prices, however, make a nickel or dime look very small indeed.

Silk Stockings Came in 1912

In the days when Coles Phillips' long-stockinged ladies were pin-up girls, one of my colleagues at Beirut landed the agency for American hosiery.

"I hate to think how much jealousy silk stockings will bring to Syria. But if I don't sell them, someone else will. This is woman's age."

That was in 1912. Feminine stockings were heavy, veils thick. Coeducation would have been unthinkable. Now students and teachers at the A. U. B. think nothing of it.

This year, for the first time, the university has experimented with dances, and the chatter afterward rivals America's most heated "bull sessions."

To conservative Moslems, mixed dancing is of the devil. Some of the men students who enjoy dancing do not allow their sisters to do so. Male solicitude and jealousy outlast veils.

But like the Crusader castles in the hills, old restraints are crumbling away. Medievalism is breaking up in one vast boom. Easy money speeds the process.

It is considered chic to spend for show and to zoom about in a $12,000 car, Detroit list $2,000. When Syrians give presents they leave the price tags on.

Cork-soled shoes—the very thing for short girls—sell for $50 a pair and evanescent hose for $10.

Beirut Students Active in Social Service

Asia's young men excel in diagnosing the world's ills. Every freshman at Beirut must *do* something to right them. In his social science he is not a spectator but an active wrestler with world problems.

Some teach their eager, but less fortunate, brothers in night school. Others hold classes in reading or group games for "basket boys" from the bazaars, clean up slums, or drain malarial pools.

Each must be the leader of a face-to-face group. At the very outset of their college course, these freshmen tackle the problems of illiteracy, ignorance, and vagrancy.

"We can never win the war against vice, superstition, and disease until more people want to make sacrifices," says Bayard Dodge, president of the university, who has given his life to the Near East.

"Social service takes time that might be

* See "Sunshine in Turkey," by Howard S. Bliss, in the National Geographic Magazine, January, 1909.

Zippered "Cleopatra" with a Basketball Is "Miss A. U. C."

Students of American University at Cairo selected Leila Meo, a descendant of the Crusaders, as their queen for 1945. Excluded from the undergraduates' vote, boys of Lincoln (preparatory) School chose another girl, one described as "keen on poetry, especially Byron" (page 236). Miss Meo is called "Cleopatra" by the campus paper's "Department of Nicknameology." It also introduces George ("Wolfie") Eliades and Wedad ("Donald Duck") Habib.

spent for amusements. It requires money that might be spent for personal pleasure. Social service is the surest basis for progress in a democratic state."

Students know that President Dodge practiced long before he preached. When his son was killed in France, the most common comment was, "It isn't fair. Dr. and Mrs. Dodge have given their lives to the world. Why their son's life, too?"

Upper classmen, freed from obligatory social service, volunteer. I accompanied some fifth-year medics to a native school, where they turned back ugly-looking eyelids to save sight (page 241).

Some of the kids whimpered with fright. Their sore eyes were being treated for the first time. But the "old-timers" took it and smiled when the ordeal was over.

After such experiences, a few warm-hearted medical students may turn their backs on the "carriage trade" and go out into the villages, as Jesus did. Even now, Beirut's medical school has spread healing throughout the lands of Jesus' ministry and beyond the cataracts of the Nile.

In its hospitals the sick and weary find health and rest. In one of them, one of our daughters was born. She is now a cadet nurse at Johns Hopkins. In this same hospital I was nursed through paratyphoid recently.

To my bedside each morning came a cheery Moslem girl from Sidon (Saïda). Later I took her photograph with her Christian girl friend, a wisecracking but efficient Armenian doctor. Sidon to Cornell is a long jump for a Moslem. But she's going to make it.

My imagination stimulated by fever, I wondered whether any of my Armenian nurses was a daughter of one of the hundreds of women I fed for the Near East Relief during a terrible winter at Van in 1917-18. They could not have been kinder, had that been true.

Two-way Lend-Lease in Culture

Our civilization came to us from the Near East, and intellectual Lend-Lease works both ways.

The university's barrel-chested director of physical education, who has studied at Ann Arbor, said to me, "We have a lot to learn from the West."

Warbound in Lebanon, Britons Point Out "Home" on a NATIONAL GEOGRAPHIC Map

The Society's "Map of the British Isles" stimulates conversation in the home of Dr. Bayard Dodge, president of the American University of Beirut. On Sunday afternoons Mrs. Dodge keeps open house for Allied servicemen. The university provides recreation facilities and lecture courses for them.

"Yes," I admitted, "but all of us who ever taught out here have learned something from the East."

Three of the happiest and most profitable years of my life were spent at the A. U. B., although my salary was the same as that of the very first three-year man, or "staffite," in 1876.

My happiness did not end there, for Beirut taught me to love Asia, to which I have been returning for thirty years of wonder and fun. Fortunate indeed are those young Americans who will fill the gaps in the Beirut teaching staff after the war. In my day there were more than a score. Today, because of war conditions, there is not one.

Meanwhile, those who taught there in the past are doing their bit. Many who now serve our global-minded Government in positions of high trust both taught and learned at Beirut, Istanbul, or Cairo.

Our first Minister to Syria and the Lebanon, George Wadsworth, took office September 26, 1944. He was not only a staffite at Beirut, but was one of the volunteers who helped Robert College weather the storm of the last war. He has first-hand knowledge of the Near East from Cairo to Tehran. His cultural attaché, "Dan" Dennett, is an old Beirut teacher. "Don" Webster, our cultural attaché at Ankara, taught at Beirut and at the International College of Smyrna, which was moved to Beirut in 1936 and allied with A. U. B.

Henry Noble MacCracken, president of Vassar, Edgar S. Furniss of Yale, and Philip K. Hitti of Princeton all began their teaching careers at Beirut. There are many more.

When the late Wendell L. Willkie visited Beirut on his *One World* flight, he uttered high praise of American missionary education.

We are not the only ones doing such work. Turkey and Egypt are laying great stress on modern education. The British, French, and others are proud of their schools.

Moslem Taboos Complicated Medical Study

My own choice of four among many excellent American institutions is open to question. Some of the outstanding students at Istanbul, Beirut, and Cairo come from elementary schools and junior colleges supported by American missionary societies, some of which were active thirty or more years before Robert College was founded.

Educational problems at Beirut are not

Robert College Introduces American Sports; Young Turks Adopt Them Enthusiastically

After classes students swarm on the two athletic fields. Basketball and soccer are most popular. Boxing, fencing, and volleyball have their followers. Football and baseball are neglected, as sod and space are lacking, but softball is the rage. On occasion the college opens track and field to all athletes of Turkey.

what they were when the Medical School was almost wrecked over Darwinism. In a Moslem world, where mutilation of a corpse is a desecration, grave robbing was the only means of securing cadavers.

One body, discovered to be that of a "mountain princess," had to be spirited back to its tomb under cover of darkness. Then there was the case of the Armenian medical student whose father died penniless, but did him an extraordinary posthumous service. When the shroud was withdrawn at the dissecting table, his face lay beneath the astonished eyes of his mourning son.

The A. U. B. has been called a "perpetual peace conference in the interest of international good will." Among 2,393 students, representing 38 different nationalities, Wahabi Arab and Jewish Esther, studying side by side, consider the same questions (page 247).

Said one of my Beirut friends: "If such an atmosphere could prevail in the countries where A. U. B. men play a prominent part, peace might come to Bible lands. As it is, oil wells and religious shrines, trade routes and racial hates make the Near East a danger zone."

American University in the Heart of Cairo

From the A. U. B., a big school in a small state, I went to the smaller American University at Cairo, situated on one of the busiest corners in all Egypt. When His Majesty, King Faruk, rides in his ornate coach from the Abdin Palace to the opening of Parliament, he passes its fine Arabesque buildings near Garden City on the Nile.

Its mid-town athletic field, inadequate for anything but basketball, volleyball, and tennis, may prove its chief asset. Purchased at a bargain many years ago with funds supplied by James H. Lockhart, of Pittsburgh, it is now worth half a million dollars. If sold, it would

This Lively Scene Beside the Nile Shocks Old-fashioned Egyptians

Outside the fence, passers-by criticize the shorts as very immodest. "It is rumored," says the student paper of the American University at Cairo, "that some coeds have decided to wear slacks to school." However, "they are not sure whether public opinion will react favorably toward such a revolution."

pay for a whole group of fine buildings, already planned for a 95-acre plot owned by the university on the way to the Pyramids.

That is on the "dead" side of the Nile, once reserved for tombs. But roadhouses and night clubs have defied the ancient tradition; so why not an institution of learning?

When there is no royal display to attract their attention, rich man, poor man, beggarman, and small boy alike gaze through the fence and see husky Egyptian girls playing basketball. When one of them body-blocks her American coach and gets the ball away from him, the man in the street finds it good clean fun.

An editorial writer in the college paper takes another angle: "Why not have women instructors for the coeds?" he writes. "The idea of having a male instructor and the fact that boys practice basketball with the coeds does not leave too good an impression on the outsiders."

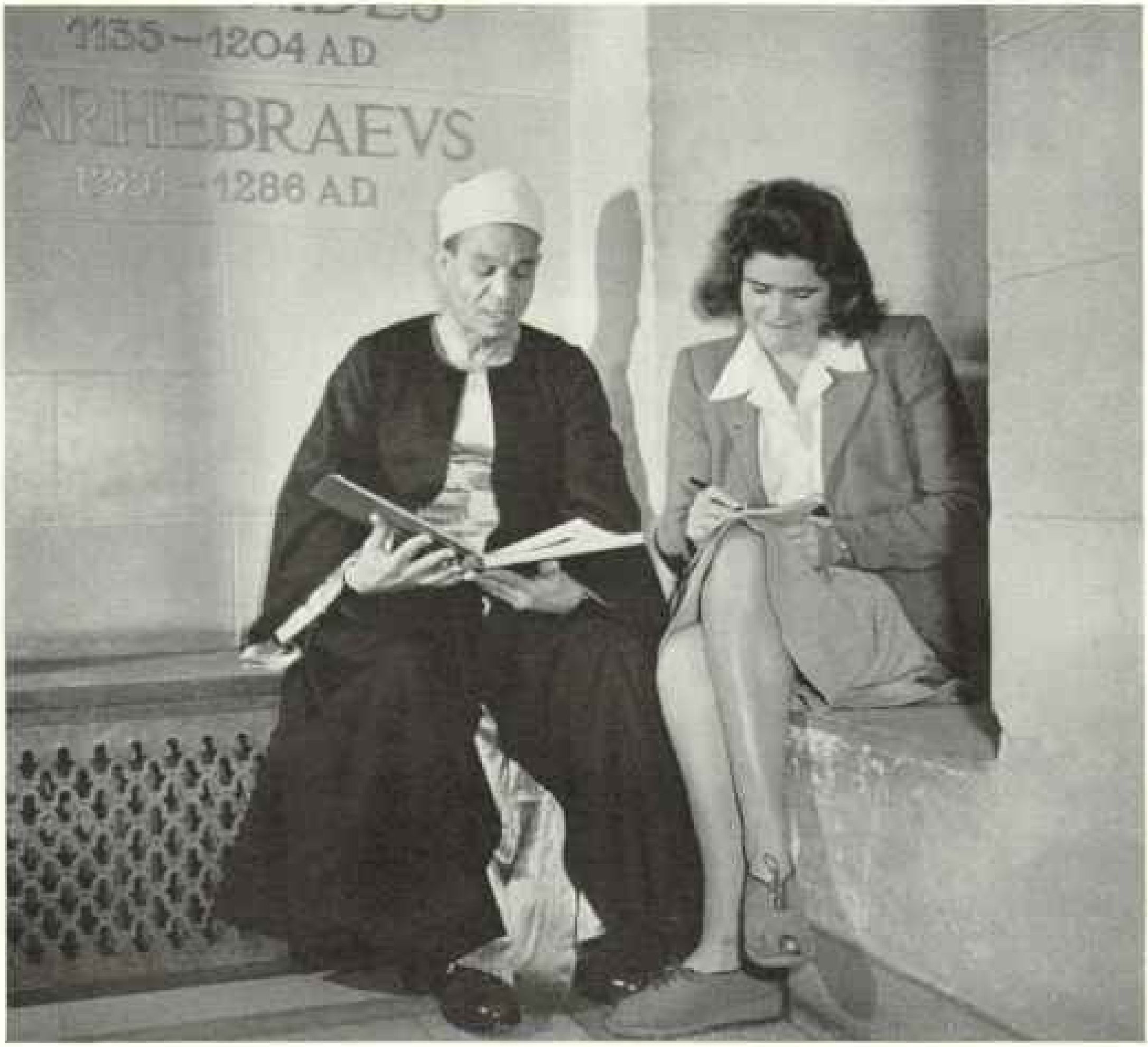
As the much-battered father of two athletic daughters, I conducted my own poll during a class in "responsible citizenship." Two of the girls were for a male coach. One couldn't see what difference it makes. The fourth was for a female coach.

The A. U. C. did not at first foster coeducation. When an influential Moslem asked that his daughter be allowed to enter what was then a men's school, the university refused.

First Coed Wins Honors

The first girl who did enter was a Copt. Miss Eva Habib el Masry not only romped away with all honors and took her M.A. at Smith, but, as an editor, has continued to batter away at male prejudice.

In its short life the A. U. C. has won an enviable place in the Arab world. King Faruk recently decorated Dr. Charles R. Watson with the Order of Ismail for his sterling service to Egypt during his 25 years as



East Teaches West in an Arabic Class for One at the School of Oriental Studies

Pupil is a French woman. Professor wears the gown of a graduate of Al Azhar, Islam's chief theological seminary. In Washington, D. C., his picture was recognized by two women who had studied under him. "There's my sheik!" each exclaimed. *Sheik* (a venerable man) is his title of respect. The School of Oriental Studies is a division of American University at Cairo. Its wall honors Barhebraeus, an oriental philosopher.

president of the American University at Cairo.

Although the university itself is only 25 years old, four of its alumni are members of the Egyptian Parliament.

Not only does the A. U. C. educate its own students in arts and sciences, pedagogy, and oriental studies (mostly for foreign students), but, as a meeting place for the thought of two worlds, it has become a "bridge of friendliness" between the United States and Egypt.

Auditorium Is Important Civic Center

Its 1,150-seat auditorium is Cairo's Carnegie Hall.

Here, in 1937, Arturo Toscanini introduced the refugee-enriched Palestine Orchestra to the Egyptian capital's music lovers. It was the greatest musical event since 1871, when the first stirring strains of "Aïda" echoed through Ismail Pasha's gold-and-ivory Royal Opera House.

Jewish musician and Arab connoisseur collaborated in an occasion memorable for its beauty.

On Sunday, April 15, 1945, while Franklin Delano Roosevelt was being laid to rest in his garden at Hyde Park, men and women of many nations gathered in this distant memorial hall to pay tribute to one who had won their love and inspired their faith.

"Nowhere but in Cairo, crossroads of the world, could such a gathering have been held," said the *Egyptian Mail*. And nowhere in Cairo was there a more fitting place of assembly. On the platform were black-robed ecclesiastics of the Greek, Coptic, and Armenian Churches.

Journalism Class at Cairo Studies New York Papers, Uses an American Typewriter

Francis T. Hoskins, a Mutual Broadcasting correspondent and faculty adviser, addresses students of the American University at Cairo. They plan the next issue of *Campus Caravan*. A recent issue names the winner of a "coed yelling contest" and announces a tug of war across a "ditch filled with mud." It refers to ancient Alexandria, Egypt, as "Alex."

In the audience were many distinguished Moslems, including representatives of King Faruk.

This beautiful hall was the result of a casual shopping trip amid the damascened copper, inlaid wood, and heavy perfumes of Cairo's famed Muski, chief thoroughfare of the native bazaar.

American Heiress Made Bequest

To Dr. Wendell Cleland, of the university, came a request that he show a 23-year-old visitor the streets of Cairo. His guest turned out to be tall, blond, beautiful, and an heiress.

After selecting antiques and curios from Egypt's past and present, she spontaneously sought a share in the country's future by proposing a memorial gift.

Sitting in the warm January sun at the Gazira Club, Dr. Cleland said that to him "memorial gift" might have meant a beautifully bound book or an athletic cup.

But at her question, "What does the university need most?" Cleland took a wild, furtive swipe at Aladdin's lamp.

"An auditorium," he gulped.

"What will it cost?"

"A hundred thousand dollars."

A long silence. Then, "I will give it to you. Can the hall be called Ewart Memorial, in honor of my grandfather, William Dana Ewart?"

Could it? It is.

Through its splendid facilities, the university is able to attract the finest talent in Egypt for public lectures intimately related to Egyptian life. Cairo's nonprofit organizations use

it almost as much as does the A. U. C.

The Division of Extension put hygiene at the top of its list of appropriate subjects. But the audiences put lectures on the "Status of Women" at the head of theirs, and they get what they want.

Once Ewart Memorial was a nice cosy place for men only. But the lectures proved so interesting that women pleaded to attend.

At first, as in some mosques, they were hidden away in the gallery. But they soon insisted on sitting in the main hall. Reconciled to the trend of events, the university opened one section to women, let the men retain two.

Then came the problem of women with escorts.

"Why should we be separated from our husbands?" they asked.

Now men sit on one side, women on the other, and women with escorts in the best seats. Unrestricted seating is already in sight.

Arab University Dates Back 1,000 Years

In the audience there are always snowy turbans of sheiks from Al Azhar, leading university in the world of Islam.

In terms of the lunar years of the Moslem calendar, Al Azhar is more than 1,000 years old, although it was not completed until A.D. 972. Before its reorganization in modern classrooms, much of its teaching was medieval, but its influence rivaled that of Mecca.

In the marble court and shady porticoes, men from the far corners of the earth gathered about their chosen teachers. United by Allah were men of many races, from Senegal to the Sulu Sea, from Kenya to Kazan.

Personal contacts between these two centers of Moslem and Christian internationalism are cordial. Well they may be, for in raising the standard of living in Egypt there are tasks for all. Cholera and dysentery are no respecters of persons. King Fuad's Museum of Hygiene was established in 1927, next door to the Palace itself.

Two days before the beginning of a Ewart Memorial lecture series on "Freedom of Thought," Egypt's Cabinet suddenly changed from conservative to liberal. When independence came to Egypt, Ewart Hall was already discussing the problems of self-government.

The message of the lectures, like the Ewart Memorial music, is "news." Photographers flash their bulbs in the speakers' eyes. Newspapers report the meetings in full.

Long one of the most widely circulated newspapers in the Moslem world, *Al Mokattam* retains a high prestige. Most influential scientific journal in Arabic is *Al Moktataf*.

Both of these great organs of Arabic thought were founded by Yaqub Sarruf, who graduated from the American University of Beirut in 1870, and Faris Nimr, of the class of '74. For their part in the Arab awakening, these two publicists were granted honorary Ph.D.'s by the A. U. B.

Yaqub Sarruf's nephew, Fuad, who edited *Al Moktataf* for many years, graduated at Beirut in 1918. Recently he resigned to devote all his time to the Arabic edition of the *Reader's Digest*. Barclay Acheson, director of its international editions, was my fellow teacher at Beirut. In the world of thought, these Beirutis do get around!

When Fuad Sarruf was teacher of journalism at the American University at Cairo, he edited the Arabic section of *Campus Caravan*, a bilingual college paper with two front pages and no back.

I visited a journalism class, taught by a Mutual Broadcasting System radio commentator, and photographed the college journalists in action—proofreading, writing headlines, and making up the first page (page 255).

Coeds in the Land of Cheops

On the copy given to me the most prominent headline was: "Solange Schinasi Lincoln's Choice for Miss A.U.C. Title" (page 250).

Shades of Cleopatra and Queen Hatshepsut! A coed popularity contest in the land of Cheops! How would you write *that* headline in hieroglyphics?

Learning English, wearing shorts, and abolishing veils do not end the story.* Today's pupils are asking, "Where do we go from here?"

Perhaps the past gives a clue.

Christopher Robert and other hard-headed philanthropists backed their faith in the future with gifts. An impulsive young girl in the bazaar shared her good fortune with the sons and daughters of the Pharaohs. Such men and women as Hamlin, Bliss, Patrick, and Watson devoted their lives to following the star.

On PT boats and in foxholes, our sons are backing their faith. The star they follow rose in the East, a long time ago. With it was born a dream of peace on earth and good will among men.

In four American colleges in Bible lands, that deathless dream is everyday reality.

* See "War Meets Peace in Egypt," by Grant Parr and G. E. Janssen, in the NATIONAL GEOGRAPHIC MAGAZINE, April, 1942.

NATIONAL GEOGRAPHIC SOCIETY

GEOGRAPHIC ADMINISTRATION BUILDINGS
SIXTEENTH AND M STREETS NORTHWEST, WASHINGTON 6, D. C.

ORGANIZED FOR "THE INCREASE AND DIFFUSION OF GEOGRAPHIC KNOWLEDGE"

To carry out the purposes for which it was founded fifty-seven years ago, the National Geographic Society publishes this Magazine monthly. All receipts are invested in The Magazine itself or expended directly to promote geographic knowledge.

Articles and photographs are desired. For material The Magazine uses, generous remuneration is made.

In addition to the editorial and photographic surveys constantly being made, The Society has sponsored more than 100 scientific expeditions, some of which required years of field work to achieve their objectives.

The Society's notable expeditions have pushed back the historic horizons of the southwestern United States to a period nearly eight centuries before Columbus crossed the Atlantic. By dating the ruins of the vast communal dwellings in that region, The Society's researches solved secrets that had puzzled historians for three hundred years.

In Mexico, The Society and the Smithsonian Institution, January 16, 1932, discovered the oldest work of man in the Americas for which we have a date. This slab of stone is engraved in Mayan characters with a date which means November 4, 291 B. C. (Spinden Correlation). It antedates by 200 years anything heretofore dated in America, and reveals a great center of early American culture, previously unknown.

On November 11, 1935, in a flight sponsored jointly by the National Geographic Society and the U. S. Army Air Corps, the world's largest balloon, *Explorer II*, ascended to the world altitude record of 72,395 feet. Capt. Albert W. Stevens and Capt. Orvil A. Anderson took aloft in the gondola nearly a ton of scientific instruments, and obtained results of extraordinary value.

The National Geographic Society–U. S. Navy Expedition camped on desert Canton Island in mid-Pacific and successfully photographed and observed the solar eclipse of 1937. The Society has taken part in many projects to increase knowledge of the sun.

The Society cooperated with Dr. William Beebe in deep-sea explorations off Bermuda, during which a world record depth of 3,028 feet was attained.

The Society granted $25,000, and in addition $75,000 was given by individual members, to the Government when the congressional appropriation for the purpose was insufficient, and the finest of the giant sequoia trees in the Giant Forest of Sequoia National Park of California were thereby saved for the American people.

One of the world's largest icefields and glacial systems outside the polar regions was discovered in Alaska and Yukon by Bradford Washburn while exploring for The Society and the Harvard Institute of Exploration, 1938.

AT SEA

Dearest:

I certainly married a smart girl! You're darn right I'd like a Hamilton, darling. Next to yourself, it's the finest anniversary present you could give me!

Did you see the attached ad? We've had Hamilton chronometers on the ship ever since she was commissioned— and, boy, they're really accurate! So don't let anyone talk you into getting me anything but a Hamilton — even if I do have to wait for it!

I'd have written sooner but we're so darn busy, a guy hasn't time to shave let alone write regularly (The Merchant Marine could sure use more men).

But I do think of you every minute, darling. And I'll be thinking of you every second on our anniversary. Did you get the present I sent you? I'd give a year's pay to be there when you open it.

Chuck

PS ABOUT THE BEARD — I'LL SHAVE IT OFF THE DAY I GET HOME!

HAMILTON

The Watch of Railroad Accuracy

THE MERCHANT MARINE NEEDS DECK AND ENGINEER OFFICERS

ENLIST TODAY

Forever Yours

IN HOME MOVIES

IT WAS rapturous fun . . . the beach . . . sand so clean and white, almost good enough to eat. Suddenly a tiny fistful darted to a tinier mouth, and . . . "It's like sugar, Mommy." Just in time did Daddy save the day.

You want to remember such typical baby moments. But *will* you? Probably not—unless you take home movies, living records of your children's every adorable age.

It takes a fine camera to make fine movies. So get a Filmo, precision-built by the makers of Hollywood's preferred studio equipment. Just sight, press a button, and *what you see, you get* . . . in rich, full color or brilliant black-and-white . . . truly professional results with truly amateur ease.

Take This First Step NOW • Send the coupon for information on Filmo Movie Cameras and Filmosound and silent Projectors to be available when our war production permits. Bell & Howell Company, Chicago; New York; Hollywood; Washington, D. C.; London.

THERE'S A FILMO CAMERA EXACTLY SUITED TO YOU

Shown in use, the improved Filmo "Sportster," an 8mm. all-purpose motion picture camera. Also a complete line of superb 16mm. equipment.

BELL & HOWELL COMPANY
7104 McCormick Road, Chicago 45

Please send information on Filmo Movie Cameras, Filmosound and silent Projectors.

Name.....

Address.....

City.....State.....

OPTI-ONICS—products combining the sciences of OPTics • electrONics • mechanICS

PRECISION-MADE BY

Bell & Howell

SINCE 1907 THE LARGEST MANUFACTURER OF PRECISION EQUIPMENT FOR MOTION PICTURE STUDIOS OF HOLLYWOOD AND THE WORLD

One of a series of events in the lives of American composers, painted for the Magnavox collection by Walter Richards

How George M. Cohan came to write "You're A Grand Old Flag"

THE grizzled veteran raised his eyes as the breeze picked up the folds of "Old Glory."

"She's a grand old flag," he murmured.

» » STANDING at his elbow, George M. Cohan heard the old man's words—swiftly turned them into one of America's great patriotic songs. Thus the composer-actor-playwright who was born on the Fourth of July is honored again this year by millions who join in singing *"You're a Grand Old Flag," "Over There,"* and others with that unmistakable Cohan speed and spirit.

Unmistakable, too, is the wonderful difference in tone when you hear patriotic music of any kind on the Magnavox radio-phonograph.

For Magnavox reproduction of music *always* gives a vital plus . . . the difference between a seat on the reviewing stand or a place on the outermost fringe of the crowd.

» » TO LEARN this difference for yourself, make a side-by-side comparison between Magnavox and *any other radio-phonograph on the market!* It is just such comparison that has made Magnavox the instrument owned by Fritz Kreisler, Eugene Ormandy, Sir Thomas Beecham, Jascha Heifetz, and others of like fame. *It's the reason, too, that your next instrument should be a Magnavox!*

» » MAGNAVOX is both a superb musical instrument and truly fine furniture . . . with styles ranging from traditional to modern. Every part is painstakingly built to give you years of pleasure and trouble-free service. Yet the cost is easily within your reach!

* * *

Send for Booklet—*Every parent, every youngster, will want to read Dr. Spaeth's "Music . . . A Priceless Heritage." Ask for a free copy at your Magnavox dealer, or send a ten cent War Stamp (to cover cost of mailing) to The Magnavox Co., Dept. NG-9, Fort Wayne 4, Ind.*

Magnavox Regency Symphony

Magnavox
RADIO PHONOGRAPH
The choice of great artists

A glance at the globe shows why NATS need more Martin Mars!

Look at the globe. Note the width of the Pacific. And remember, distance doesn't lend enchantment, where logistics are concerned!

How to get blood, vital supplies, or personnel across the Pacific *quickly?* That's a job for the NATS . . . the Naval Air Transport Service!

NATS Swarm Over Every Ocean

Thanks to the NATS, life-giving whole blood reached the Leyte beachhead 48 hours after leaving San Francisco. Thanks to the NATS ten *billion* letters were flown over the Pacific alone in 1944. And thanks to the NATS, our fighting men, from Rio to Okinawa, are receiving high-priority cargoes . . . ammunition, penicillin, radio parts, aircraft tires, etc., . . . in ever-increasing volume.

Bright Stars in Pacific Skies

Brightest stars in Pacific skies are the NATS' new 82-ton Martin Mars cargo carriers. The original Mars in its first year flew the equivalent of 9 trips around the world . . . carried more than two million pounds of cargo . . . was never in port more than 2 days for turn-around. And the new Mars flying freighters, now joining NATS, show higher performance.

A Promise to Tomorrow's Airlines

Martin flying boats will pay big dividends to tomorrow's airlines. Proved in service with NATS, both Mars and Mariner are known quantities. Both are in production right now . . . a fact which will mean prompt delivery, at minimum costs, of postwar commercial versions. So for speed, comfort and economy . . . plan to travel or ship, via Martin flying boat! THE GLENN L. MARTIN COMPANY, BALTIMORE 3, MD.

The Glenn L. Martin-Nebraska Company—Omaha

This insignia is a welcome sight to our fighting men on every front.

NAVAL AIR TRANSPORT SERVICE

Martin
AIRCRAFT

Builders of Dependable Aircraft Since 1909

A Bouquet for a Formula

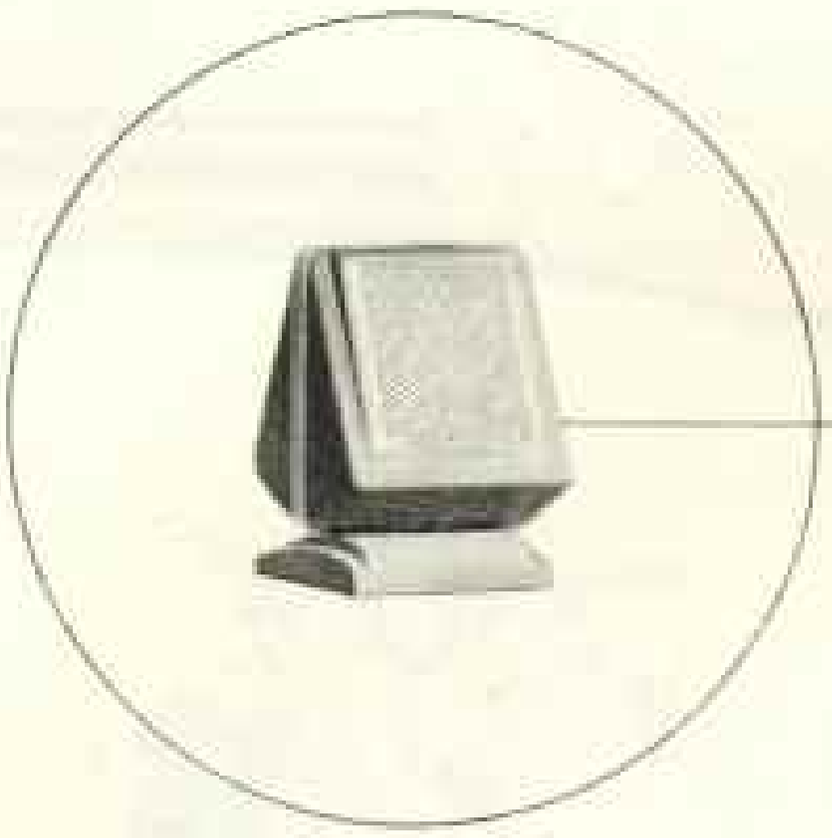
"AS MY DAUGHTER is the wife of an army man who was moved suddenly from Ft. Lewis for further maneuvers, we did not know until the week before I was to return that she and the baby would go with me. It was too late to get an additional berth, but as we are both short, we put the baby's basket at our feet and were very comfortable.

"The steward gave my daughter the privilege of making up the baby's formula each afternoon, in the galley, and as there was always plenty of very hot water in the ladies' room, she heated it there—also bathed him each day. Our porter let the berth stay made-up during the day—making it possible for the baby's nap. We could not have been any more comfortable had we been in our own home."

So wrote Mrs. H. L. Buchanan of Haddonfield, N. J., shortly after a trip from Tacoma, Wash., to Chicago on The Olympian with her daughter and grandson. The Milwaukee Road is glad to get such bouquets (letters) at any time. But with a war on, they're doubly welcome.

The Milwaukee Road

SERVING THE SERVICES AND YOU



Control Center

FOR A SALES EXECUTIVE'S STRATEGY

There's something *new* in his office! It's the small desk microphone that is the heart of Dictaphone *Electronic* Dictation.

It provides him with new dictating ease and convenience. It enables him to dictate at any time, without requiring the presence of his secretary. It discourages mistakes and misunderstandings. It encourages him to record his ideas and instructions instantaneously—while they're fresh in mind. It even records his over-the-desk conversations.

Because it brings such complete facility in getting things done, it is literally a Control Center for *action*. Why not learn now about Dictaphone Electronic Dictation for yourself? Send for new descriptive literature.

Dictaphone Corporation, 420 Lexington Avenue, New York 17, N. Y. In Canada: Dictaphone Corporation, Ltd., 86 Richmond St. W., Toronto 2, Ont.

DICTAPHONE *Electronic Dictation*

The word DICTAPHONE is the registered trade-mark of Dictaphone Corporation, makers of Acoustic and Electronic dictating machines and other sound recording and reproducing equipment bearing said trade-mark.

1st

with a factory program for universal service

Henry Ford long ago declared: "A sale does not complete the transaction between us and the buyer, but establishes a new obligation on us to see that his car gives him service."

Early, the Ford Motor Company saw the need for personal service, precision tools, trained mechanics. From all over the world men came to the Ford plant for service method training. In a sense, they took with them part of the factory itself, methods and ideals, and thus Ford service became universal.

Through the development of special-purpose tools and scientific methods, Ford was first to make it possible for dealers to give service measuring up to the precision built into the original car. Today Authorized Ford Service dealers everywhere have available a complete line of factory-approved tools that mean finer workmanship, greater economy for the car owner. And the Ford Motor Company continues to supervise the training of men who will use these tools.

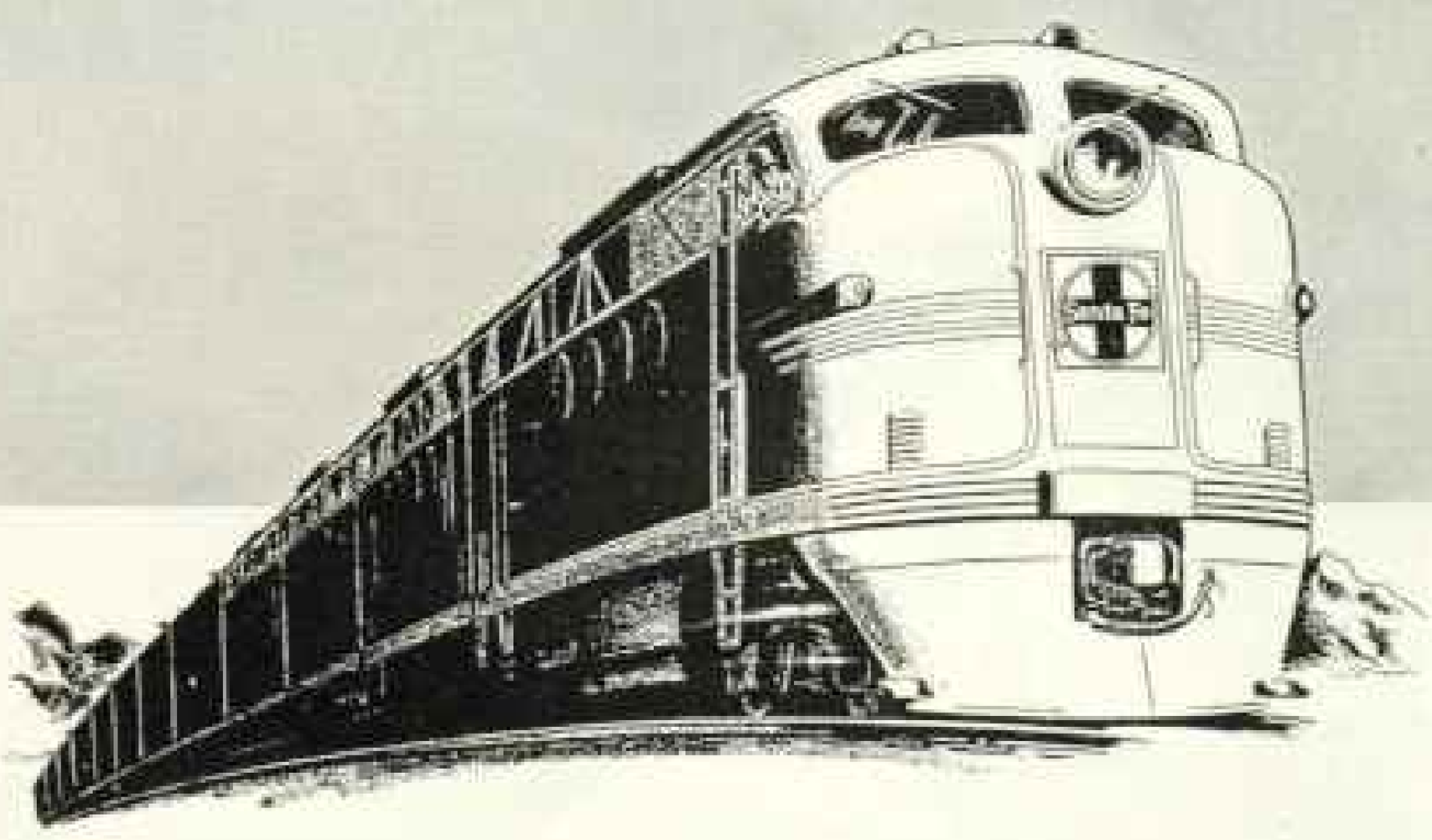
Here is one more of many important Ford "firsts." It is paying extra rewards to owners under wartime driving conditions.

"THE FORD SHOW" Singing stars, orchestra and chorus. Sunday, complete NBC network. 2:30 P.M., E.W.T., 1 P.M., C.W.T., 12:30 M., M.W.T., 11:30 A.M., P.W.T.

Ford

EXPECT THE "FIRSTS" FROM FORD!

Doin' it with Diesels on the Santa Fe



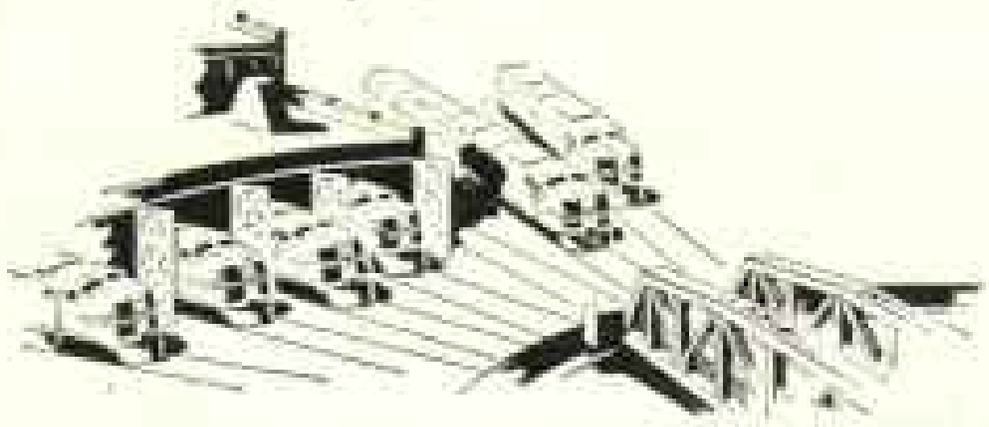
Hauling mile-long war freights over steep mountain grades calls for plenty of head-end power.

Santa Fe is providing a lot of that power with the greatest fleet of 5400 horsepower Diesel locomotives in American railroading.

68 of these blue and yellow "head-ends"—the most powerful freight Diesels in the world—are now in operation over the toughest mountain climbs on the Santa Fe—*and more are on order.*

Santa Fe's dieselization program is another important step in getting the war freight through faster along "The Route to Tokyo"—and in providing the most modern freight equipment to meet transportation needs in the days of peace to come.

Six of the big fleet of Santa Fe freight Diesels at a service base.



Santa Fe

SANTA FE SYSTEM LINES

Serving The West and Southwest

THERE'S A NEW STANDARD IN AIR TRANSPORTATION!

Lockheed Constellation

Lockheed Aircraft Corporation, Burbank, California — *Years ahead in the science of flight*

This painting of the driving of the Golden Spike on September 8, 1883, is a composite, in Currier & Ives style, of an actual photograph of the historic engine and a mural now decorating the Montana State Capitol in Helena.

WRITING NEW RAILROAD HISTORY

Sun glinting on yellow metal marked a great moment in railroad history that day in September, 1883. At Gold Creek, Montana, General U. S. Grant drove home a golden spike—and the Northern Pacific, first of the northern transcontinental railroads, was completed.

Shortly after, a special train puffed over the spot, carrying officials and distinguished guests from the East and Europe on the first through train trip from St. Paul to Portland, Oregon.

History is still being made on the Northern Pacific, as great trains of battle-bound freight hurry westward in support of fighting forces.

For here mighty GM Diesel freight locomotives are writing a brilliant record of accomplishment over steep and twisting mountain grades.

Hauling greater tonnages faster and at lower cost, they are showing today what tomorrow can bring when whole lines are GM Dieselized. Then this momentous power will usher in an era when freight will travel faster, passengers ride with greater comfort, speed and luxury, and the whole land benefit from lower railroading costs.

Wichita Plant—Boeing Airplane Company

How to increase war production

There are many ways, both human and mechanical. But one of the simplest is to see that workers get good food to eat.

In plants all across the country, cafeterias, canteens and food wagons serving nutritious, well-balanced meals have cut down accidents and illness, while stepping up production.

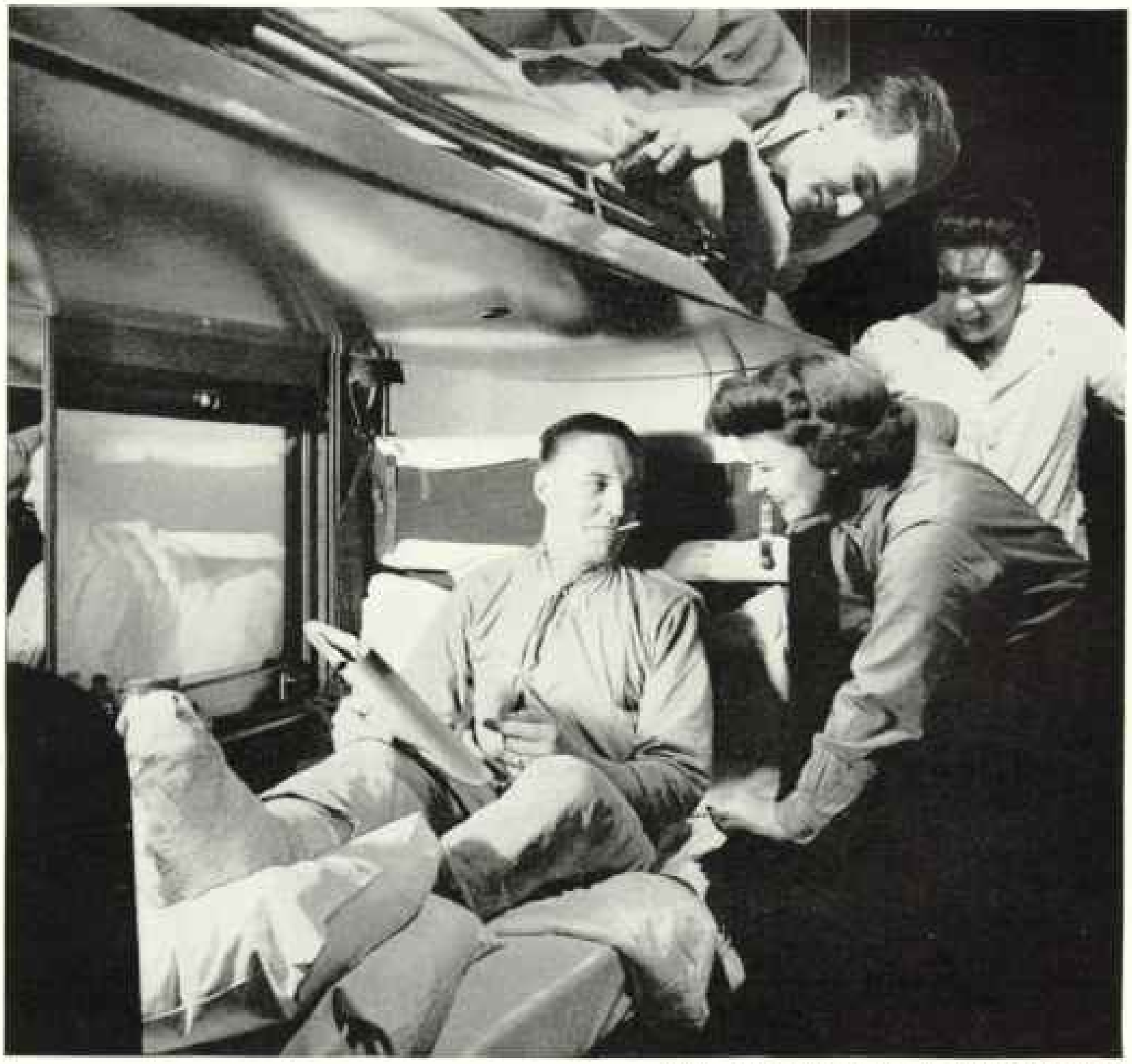
An Alabama mill increased production 10% within two weeks after food service was installed. A Washington plant cut labor turnover and absenteeism in half by opening a modern cafeteria. A California construction company found that lost time saved by a good dietitian totaled $24,000 in 14 months.★

Milk, of course, is a basic part of all these food programs, for *milk is nature's most nearly perfect food.* By serving workers a free pint of milk daily, during a five-minute recess, a New Jersey rubber company reduced accidents 30%, sent production up and absenteeism down.

We're glad that milk and its many products are helping to keep war workers on the job and war production rolling. We're on the job, too, in the National Dairy Laboratories, searching always for new and better ways to bring you the good health inherent in milk.

★All figures from War Food Administration which will gladly help you plan a sound food program.

Dedicated to the wider use and better understanding of dairy products as human food . . . as a base for the development of new products and materials . . . as a source of health and enduring progress on the farms and in the towns and cities of America.



Photographed en route by permission of the War Department

"How you doing, soldier?"

O. K., nurse, says this wounded soldier's smile.

The *big* reason he's doing so well is the wonderful care the men and women of the Army Medical Corps give American wounded—*the best cared for wounded in the world.*

But *part* of the reason is just being in *America again.* That's a tonic in itself to these men who were wounded in Europe before Germany surrendered and are now on their way from debarkation ports to General Hospitals near their homes.

Pullman—by providing sleeping cars to supplement the Army's special hospital trains—is privileged to contribute to the comfort in which they make the trip.

These cars—like the one in the picture—are probably scattered over several states, serving various railroads, when an Army call for them comes. But the way Pullman works with the railroads—through its centrally controlled "pool" of sleeping cars—enables them to be assembled quickly, even on short notice.

It takes lots of cars. And shifting troops across America to the Pacific takes lots *more.*

So, if you *have* to take a trip—and *should* be unable to get the Pullman space you want exactly when you want it—please remember that many of the wounded coming home from Europe and many men going "on to Tokyo" are *traveling Pullman, too.*

PULLMAN **For more than 80 years the greatest name in passenger transportation**

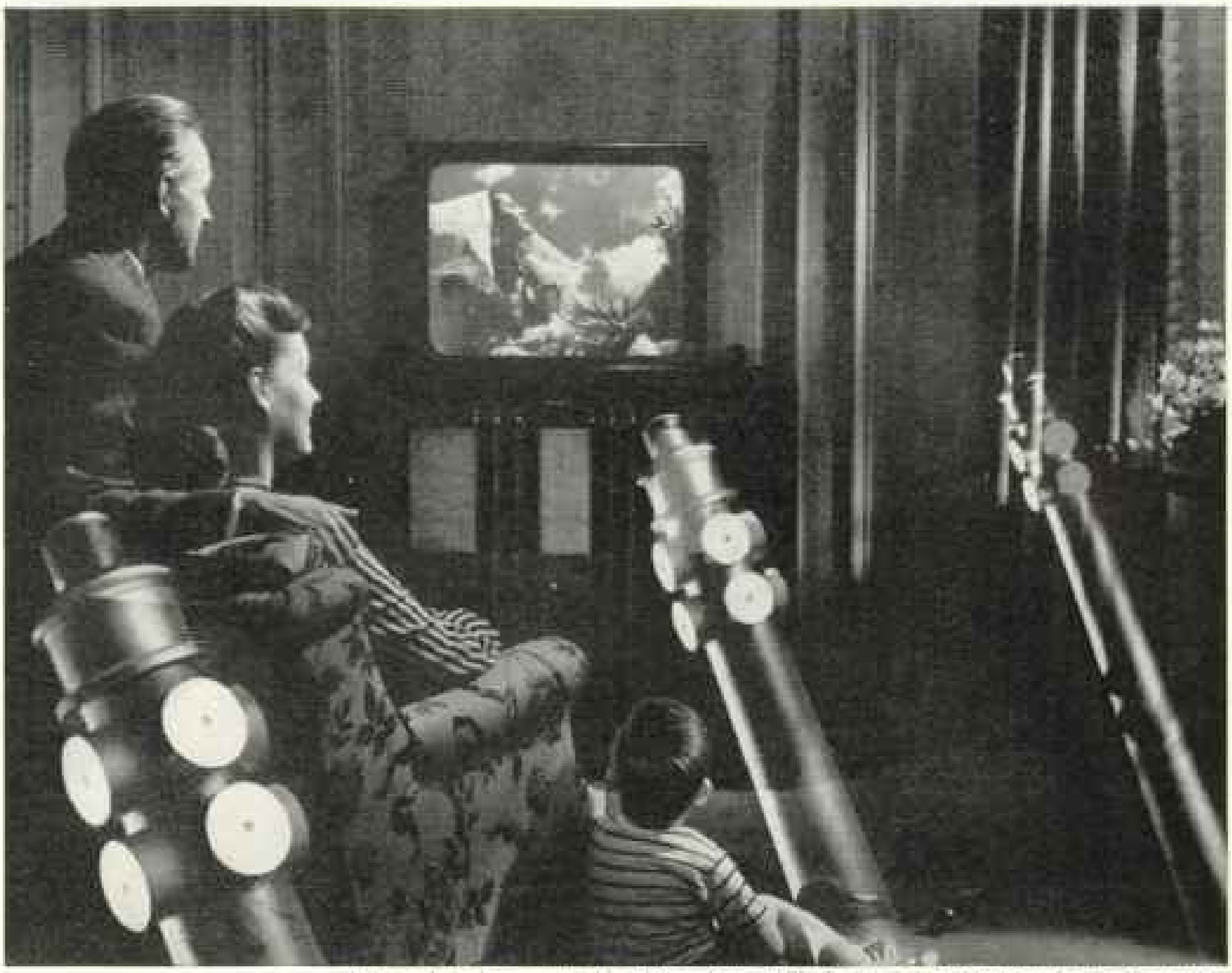
Broad and unmistakable is the path
beaten by Matson across the Pacific
since the days of sailing ships.
Through all this time Matson's business
has been transportation, *and it has been*
its purpose, with ever-improved
equipment, to make even more acces-
sible the loveliness of these Island regions.
Today, those who know the Pacific know Matson.
And for tomorrow's traveler in the Pacific—
whether by air or by sea — *Matson plans the*
very finest in modern and efficient transportation.

Matson KNOWS THE PACIFIC

MATSON LINES TO HAWAII AND THE SOUTH PACIFIC

SAMOA • FIJI • NEW ZEALAND • AUSTRALIA

OFFICES: SAN FRANCISCO • LOS ANGELES • NEW YORK • CHICAGO



RCA radio-relay towers—like those above—will give post-war television far greater range.

Coast-to-Coast Television...

through "Radio-Relay"

For a long time it looked as though post-war television might be confined to local stations. That was because the ultra short waves that carry television do not bend with the curvature of the earth. They go in a straight line out to the horizon—and then into the sky.

But today, this handicap has been overcome—by RCA scientists and engineers.

The *radio-relay* was developed—a tower that "bounces" television programs to the next tower 30 to 50 miles away. Through a network of these automatic, unattended, radio relays, coast-to-coast television is made practical.

This is but one more example of how RCA research constantly "makes things better." Such research is reflected in *all* RCA products. And when you buy a television set, or radio-phonograph, or anything made by RCA, you enjoy a unique pride of ownership. You can be sure it is one of the finest instruments of its kind that science has achieved.

C. W. Hansell, RCA specialist in transmitters and relays, is shown here with a new and enlarged radio-relay reflector that can "bounce" radio messages, radiophotos and Frequency Modulation programs at the same time that it relays television from coast to coast!

RADIO CORPORATION of AMERICA

PIONEERS IN PROGRESS

THE *fastest* SHIPBOARD FIGHTER IN THE WORLD

A new Vought Corsair is coming up.

This latest version of the world's fastest shipboard fighter takes off *faster* — flies *farther faster* — climbs *higher faster*.

* * *

Great warplanes such as the new Corsair do not happen over night. They take years of development.

An experimental model is designed and built, subjected to grueling test. Before production can begin, intricate manufacturing problems must be solved, plants tooled up.

As production models go into military service, testing continues. New tactics evolve from maneuvers and from the flaming test of battle. These dictate design changes to be developed, tested and put into production — starting a new cycle in the continuous development of the airplane.

This takes time. The original Corsair fighter, built by Vought and by Goodyear to Vought design, was conceived seven years ago. Designed for shipboard use, it first saw action three years ago with the Marines on Guadalcanal as a land-based fighter where it licked the best fighters the Japanese could offer. Now operating from aircraft carriers, it is playing a vital role in Navy task force attacks upon Japan itself, as a fighter, fighter-bomber and night fighter.

* * *

The new Corsair is a product of this intensive continuous development that has established America's supremacy in the air.

These cycles — development and production by the aircraft industry and testing and proving by the armed forces — must continue as national policy if this nation is to preserve in the future its security in the skies.

UNITED AIRCRAFT CORPORATION

EAST HARTFORD, CONNECTICUT

PRATT & WHITNEY ENGINES • HAMILTON STANDARD PROPELLERS • CHANCE VOUGHT AIRPLANES • SIKORSKY HELICOPTERS

Why Uncle Sam is ahead more than

6 MILLION DOLLARS A DAY

BALANCE SHEET

In the other World War

The railroads, in 1918, performed 405 billion ton-miles of freight service.

Railroads performed 42 billion miles of passenger service in 1918.

Freight rates were raised about 25%.

The government took over the operation of the railroads.

Deficits resulting from Federal operation cost the taxpayers 2 million dollars a day.

In this World War

The railroads, in 1943, performed 727 billion ton-miles of freight service. 737 billion in 1944.

Railroads performed 87 billion miles of passenger service in 1943 and 95 billion in 1944.

Freight rates remain substantially the same as they were prior to the war.

The railroads have remained under their own management.

The railroads are paying Federal taxes at the rate of more than 4 million dollars a day—to say nothing of their state and local taxes.

ASSOCIATION OF
AMERICAN RAILROADS
All United for Victory

Coming closer...

YOUR PROUD POSSESSION OF A PARKER "51"

YOU know that famous Parker 51's are scarce. The "51" is created by unhurried precision craftsmanship. And today, with Parker working first to produce vital war equipment, we build but a fraction of the pens we could sell.

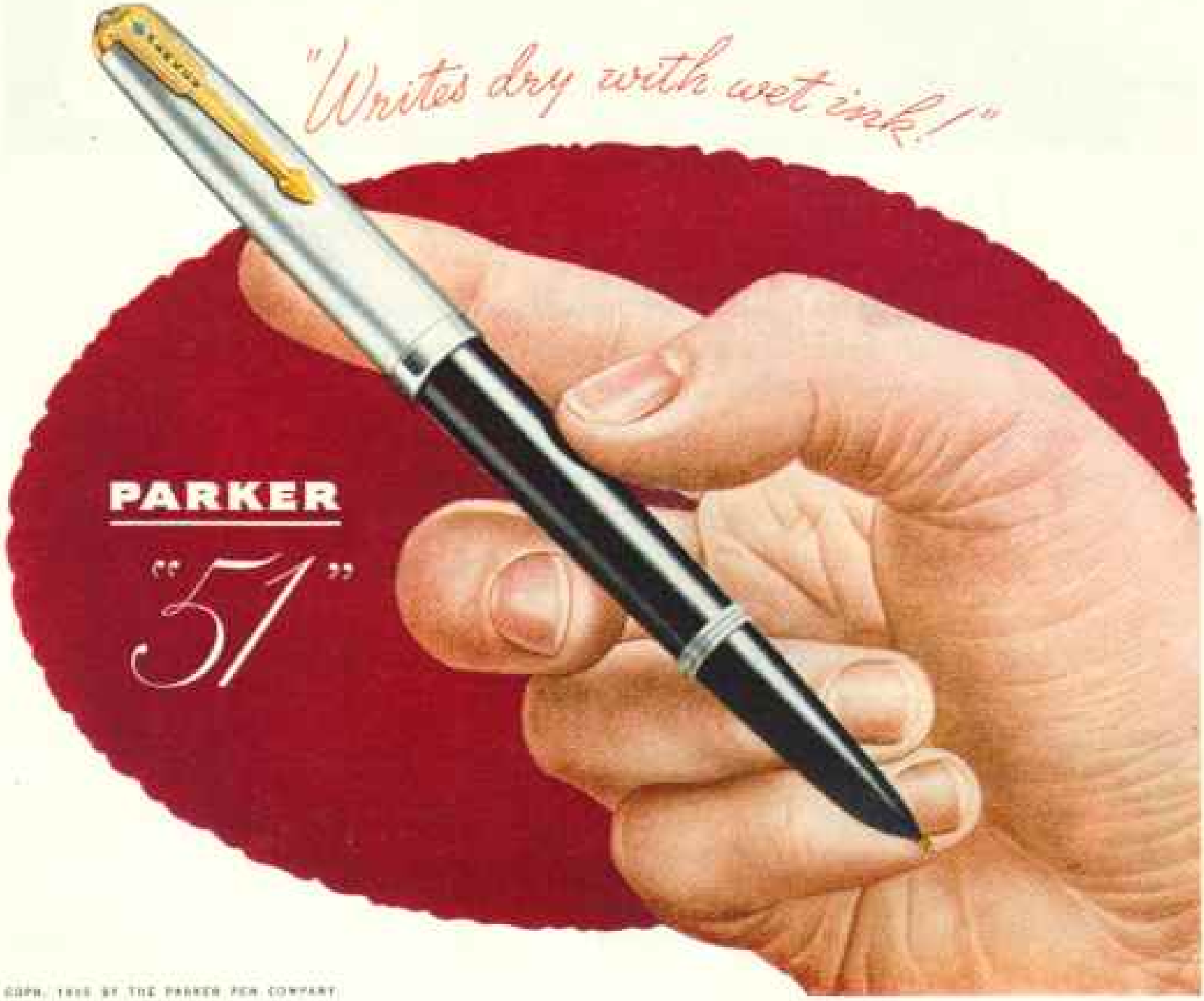
Happily, more *are* coming. We hope the day is not far off when you may own a "51."

Then touch that protected point to paper—and see, it starts to write instantly! The protected Osmiridium tip seems to float above paper.

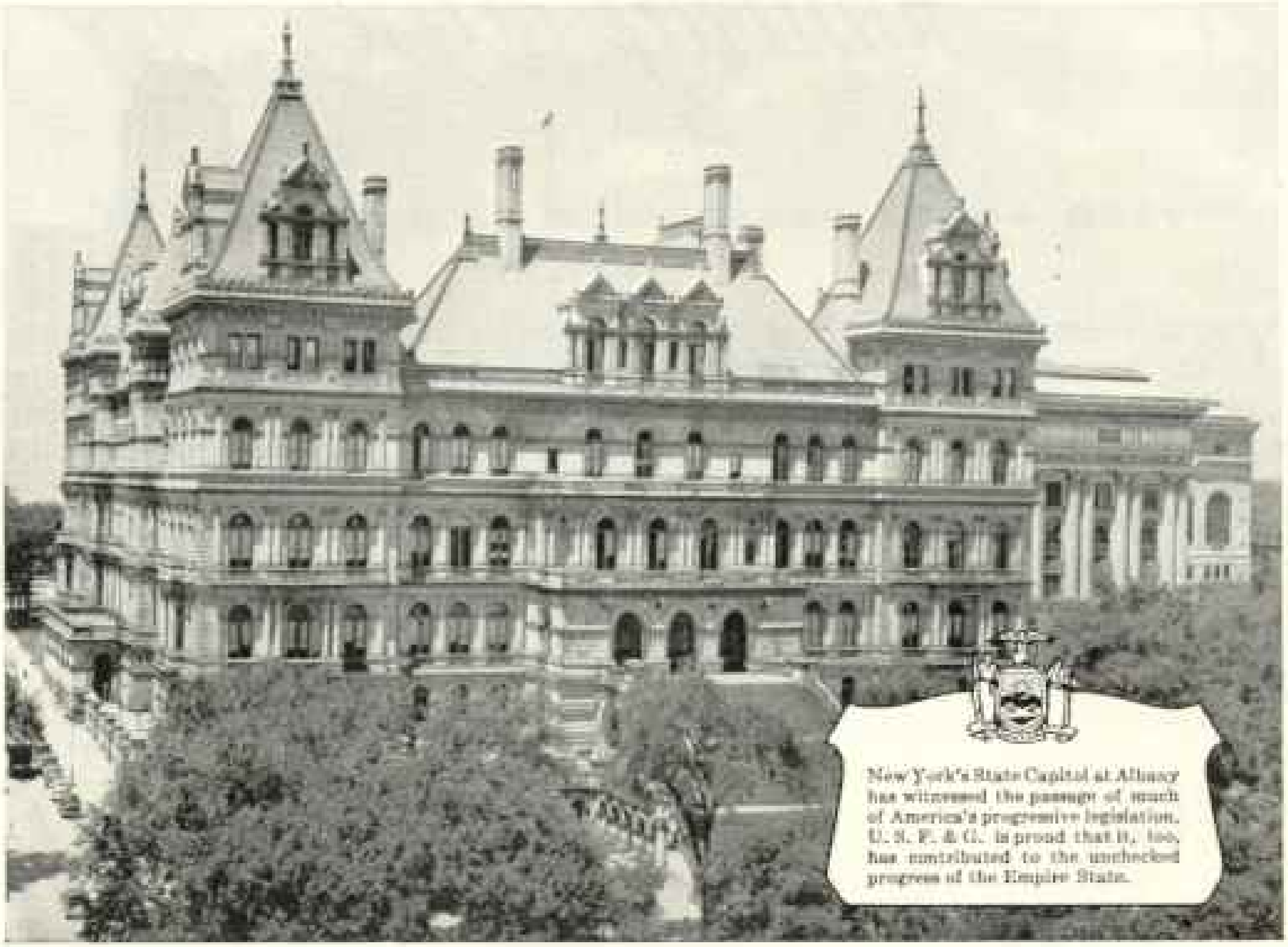
And each word dries as you write! For only this pen has the design and construction which permit satisfactory use of the world's fastest drying ink, Parker "51" Ink. (Any ordinary ink may also be used.) This pen is worth a wait. Place a reservation order with your dealer now.

Colors: Black, Blue Cedar, Dove Gray, Cordovan Brown. $12.50 and $15.00. Pencils, $5.00 and $7.50. Sets, $17.50 to $80.00. Famous Parker Vacumatic Pens, $8.75. Pencils, $4.00. The Parker Pen Company, Janesville, Wisconsin.

MAKE YOUR DOLLARS FIGHT—BUY WAR BONDS NOW.



U. S. F. & G. *salutes the Empire State!*



New York's State Capitol at Albany has witnessed the passage of much of America's progressive legislation. U. S. F. & G. is proud that it, too, has contributed to the unchecked progress of the Empire State.

New York Pioneers in Progress!

From the days when New York's turnpikes and canals were the wonder of the nation, to its present-day skyscrapers, super-highways and public works . . . New York has pioneered in progress. First in number of residents, one of the leaders in the value of farm products, home of great industrial and financial concerns, famed for scenic beauty and urban smartness, this is truly the Empire State! ¶ In New York, as in every state, U. S. F. & G. safeguards business and the individual, writing practically all forms of fidelity and surety bonds and casualty insurance policies.

Consult your insurance agent or broker as you would your doctor or lawyer

U. S. F. & G.

UNITED STATES
FIDELITY & GUARANTY CO.
affiliate
FIDELITY AND GUARANTY FIRE CORPORATION
HOME OFFICES: BALTIMORE 3, MD.

TODAY'S "PACEMAKER"

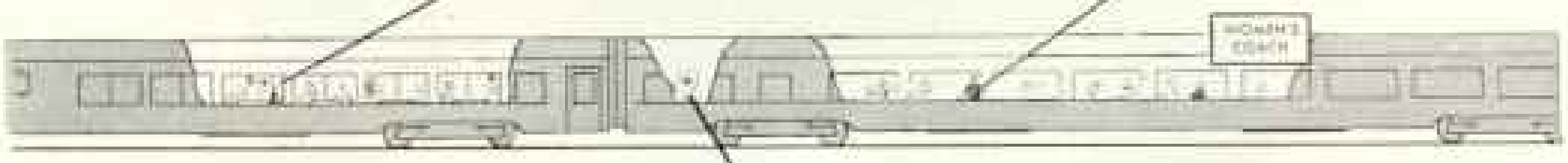
Setting the pace for the coach streamliners of tomorrow

Mealtime Money's Worth

Pacemaker meals are attractively served and *thrifty!* Yet even on this low-cost menu, Central allows service men and women a special discount.

First Date With Dad

Due to meet her Navy Dad for first time, Ruby takes a beauty nap in Women's Coach. Maid watches, while Mother dines.



Modern Slant on Sleep

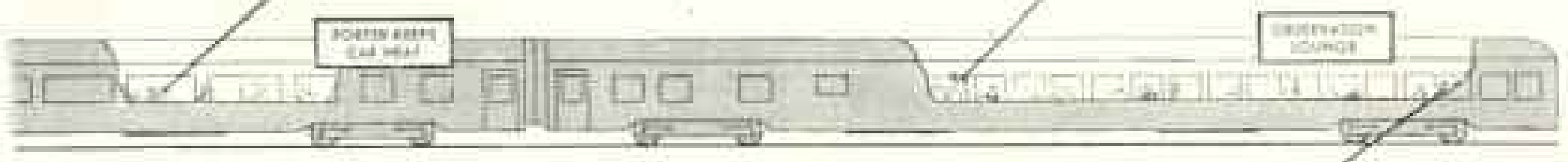
At night, when coach lights dim to a soothing blue, the Pacemaker's pillow-soft seats can be slanted back to a sleep-inviting angle.

Boudoir on Wheels

Thanks to Pacemaker's spacious, modern dressing lounges, it's easy for a woman to keep looking her best . . . even when traveling light in wartime.

Night and Day Favorite

Open to all Pacemaker passengers without charge, the Club-Observation Lounge is a delightful place to chat, read, or enjoy refreshments.



The Good Old U. S. A.

Fighters renew acquaintance with America as busy cities, fertile farms, and homey villages roll past Pacemaker's wide windows.

BY DAY, uniforms and civilian clothes mingle in the cheery dining and club cars. By night, coach seats tip back restfully, and the hum of the wheels lulls these passengers as they travel on a schedule almost as fast as the 20th Century's own.

For this is New York Central's all-coach Pacemaker. And it has sped some 1,700,000 war-time passengers between New York and Chicago . . . setting the pace for still finer coach streamliners that will add thrills to thrifty travel on the peacetime Water Level Route.

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"Ground Flight" of a Boeing Superfortress

In a corner of Boeing's Seattle plant is a one-room house alongside a large steel frame in which an engine and a section of wing are firmly anchored. House, frame and engine can all be revolved on a circular track.

Designed by Boeing engineers, it is capable of testing the characteristics of power-plant installations for great warplanes and transports of the future! The picture above was taken when the Boeing B-29 Superfortress—now flown so valiantly by Army Air Force crews in Japanese skies—was still in the development stage.

Hour after hour, week after week, the 2200-hp. engine roared and tugged at its captive wing section. Inside the little laboratory men watched a battery of instruments, testing the functioning of the power-plant with its many services and accessories at various engine speeds and powers—finding out how a new nacelle design affected their operation.

The B-29 nacelles offered Boeing engineers a tough problem. Each one had to be big enough to accommodate a huge, complicated radial engine, dual turbo-superchargers, three separate cooling systems, intake and exhaust, electrical and ignition systems and fuel lines. Yet each had to be slim and compact, to reduce drag, for the B-29 was to be a bomber with the speed of a pursuit ship.

The long bombing missions flown by the Superfortresses, through every variation of temperature, are striking testimony to the success of Boeing engineers.

Sound research, design, engineering and manufacture have always gone into every Boeing product . . . one reason why you can depend on peacetime aircraft of the future, "Built by Boeing" to lead the way.

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HEART DISEASE

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Truth, based on modern medical science, replaces doubt with facts . . . bringing new hope and comforting reassurance to all who have been worried about their hearts.

Myth #1

If you have the symptoms, you *must* have the disease.

That's not true! Such symptoms as pain or a feeling of oppression in the chest, shortness of breath, rapid or irregular heartbeat, *may* be signs of heart trouble, but frequently come from other sources.

Consult your doctor if these symptoms occur. His diagnosis, aided when necessary by the fluoroscope and electrocardiograph, may enable him to reassure you that you do *not* have heart trouble.

Myth #2

If you're going to get it . . . you're going to get it.

That's not true! Everyone, particularly those over 40, can do much to forestall heart disease by following these rules:

1. Exercise regularly, but moderately. **2.** Keep your weight down. If overweight, *bring* it down. **3.** Get plenty of sleep—8 hours a night for most people. **4.** Eat moderately. Be moderate in use of tobacco or stimulants. **5.** Have a yearly examination by your doctor. Follow his advice.

Myth #3

If you have heart disease you will be a permanent invalid.

That's not true! Thousands of people who have heart disease are leading useful and nearly normal lives by following their doctor's advice.

There's a lot of truth in the expression, "To live a long life, start taking care of a bad heart early."

For helpful information concerning your heart, send for the Metropolitan's free booklet, 85N, "Protecting Your Heart."

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The sergeant's father has been busy on an important Studebaker war production job—A veteran of over 32 years' Studebaker employment, this head of the Kowalski family has two fine sons in the American Army—Edward, as well as his former Studebaker team-mate, Roman.

YOUR WAR BONDS HELP KEEP AMERICA STRONG

They're half the world apart but still "working together"

THERE'S a lot more difference between India and Indiana than is represented by spelling and geography.

No one knows this better than U. S. Army Sergeant Roman Kowalski, now "sweating it out" as a radio operator in the steaming CBI theater, thousands of miles from his comfortable home in South Bend.

Until September, 1942, when he entered the armed forces, this young man had been a team-mate of his father on a Studebaker assembly line. Yet, although separated by many miles, the two have continued to "work together" in a common cause as the father, with increased determination, helps Studebaker produce military equipment.

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"When city folks came climbing up these Montana mountains, I'd play hide-and-seek up high, where the clouds are born.

"I'd drink from the streams and lakes when trout fishermen looked the other way.

"But this year — like in 1943 and 1944 — folks aren't coming to Glacier Park because the hotels and chalets are closed.

"Maybe you've been lonesome for the lakes and mountains and good times in Glacier Park. Well, I've been lonesome for you, too!

"What a great day it will be when you can all come back here again after the war! The Park will be more beautiful, more inviting than ever. And Great Northern Railway will have even finer, faster trains to bring you here.

"Yes, some summer soon we'll have more fun together in Glacier National Park in Montana!"

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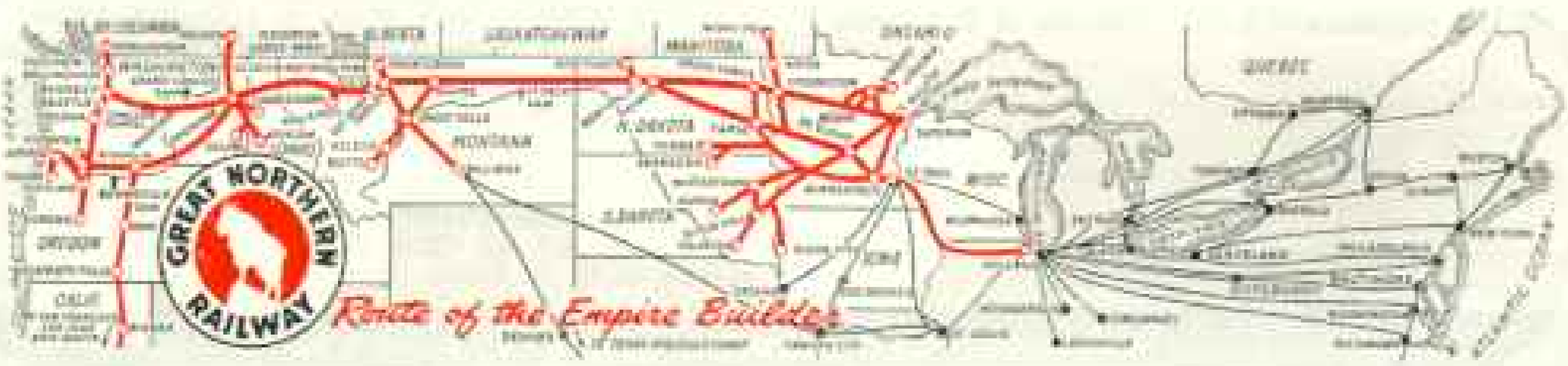
BETWEEN GREAT LAKES AND PACIFIC



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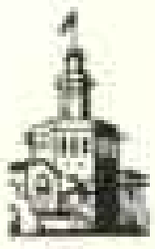

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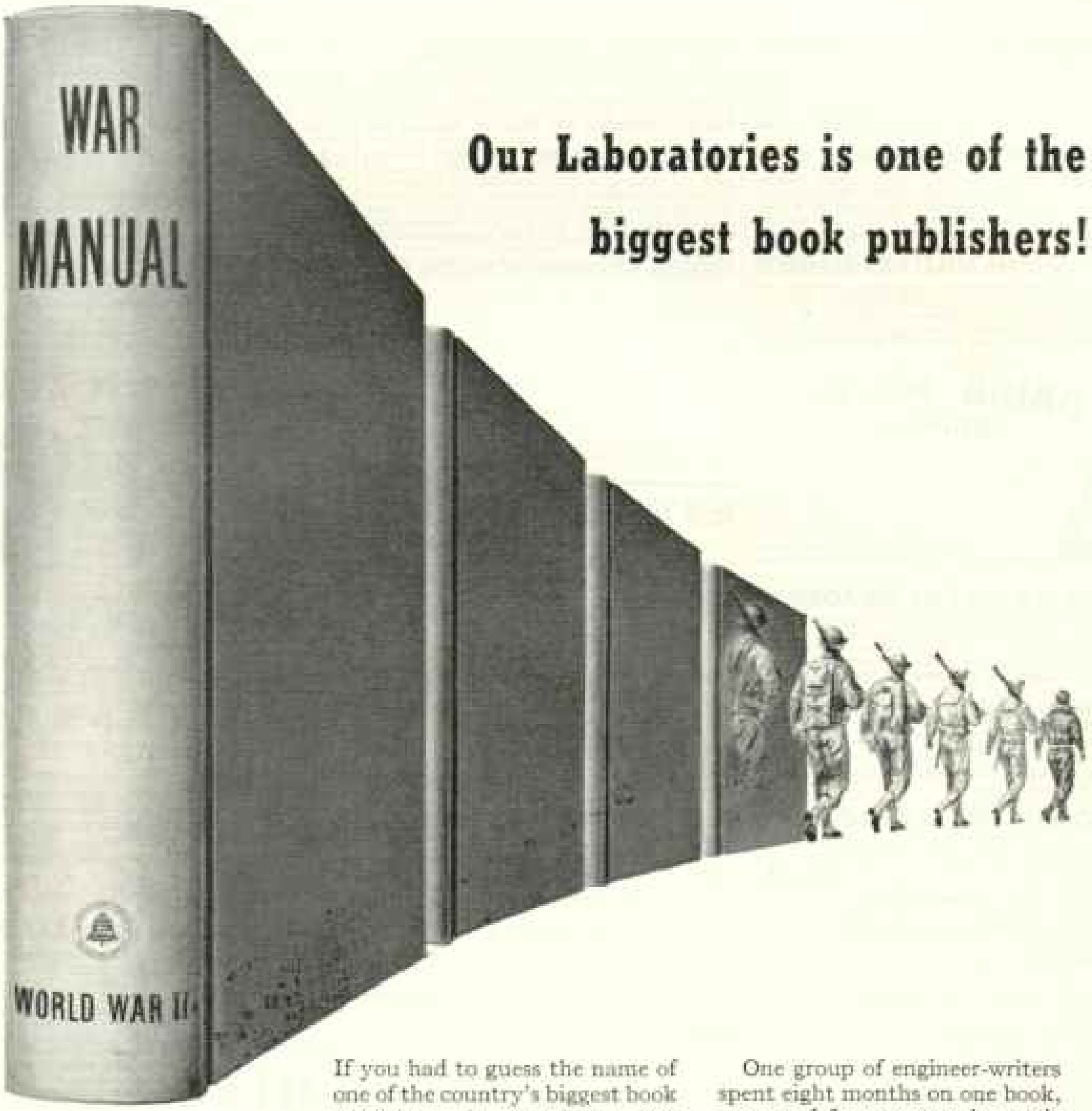

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